

UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA

AMPEREX TECHNOLOGY LIMITED,	:	
	:	
Plaintiff and	:	Civil Action
Counter Defendant	:	No. 1:23-cv-00272-PTG-LRV
	:	
v.	:	
	:	September 30, 2024
SEMICONDUCTOR ENERGY	:	10:03 a.m.
LABORATORY CO., LTD.,	:	
	:	
Defendant and	:	
Counter Claimant.	:	
	:	
.....	:	

TRANSCRIPT OF MOTION HEARING PROCEEDINGS
BEFORE THE HONORABLE PATRICIA TOLLIVER GILES,
UNITED STATES DISTRICT COURT JUDGE

APPEARANCES:

For the Plaintiff and
Counter Defendant:

Brandon Brown, Esq.
KIRKLAND & ELLIS, LLP
555 California Street
27th Floor
San Francisco, CA 94104
415-439-1400
Fax: 415-439-1500
Email: Bhbrown@kirkland.com

Craig Crandall Reilly, Esq.
LAW OFFICE OF CRAIG C. REILLY
209 Madison Street
Suite 501
Alexandria, VA 22314
703-549-5354
Fax: 703-549-2604
Email:
Craig.reilly@ccreillylaw.com

APPEARANCES: (Cont.)

For the Plaintiff and
Counter Defendant:

Lindsey Shi, Esq.
KIRKLAND & ELLIS, LLP (CA-NA)
555 South Flower Street
Suite 3700
Los Angeles, CA 90071
213-680-8400
Fax: 213-680-8500
Email: Lindsey.shi@kirkland.com

Yimeng Dou, Esq.
KIRKLAND & ELLIS LLP (CA-NA)
555 South Flower Street
Suite 3700
Los Angeles, CA 90071
213-680-8400
Fax: 213-680-8500
Email: Yimeng.dou@kirkland.com

For the Defendant and
Counter Claimant:

Ahmed Jamal Davis, Esq.
FISH & RICHARDSON PC (DC)
1000 Maine Avenue, SW
Suite 1000
Washington, DC 20024
202-783-5070
Fax: 202-783-2331
Email: Adavis@fr.com

Christina Brown-Marshall, Esq.
FISH & RICHARDSON PC (GA-NA)
1180 Peachtree Street NE
21st Floor
Atlanta, GA 30309
404-892-5005
Fax: 404-892-5002
Email: Brown-marshall@fr.com

Court Reporter:

Scott L. Wallace, RDR, RMR, CRR
Official Court Reporter
United States District Court
401 Courthouse Square
Alexandria, VA 22314-5798
Cell: 443-584-6558
Email: Scottwallace.edva@gmail.com

Proceedings reported by machine shorthand, transcript produced
by computer-aided transcription.

MORNING SESSION, SEPTEMBER 30, 2024

(10:03 a.m.)

THE COURTROOM CLERK: Civil Action 2023-cv-272, *Amperex Technology, Limited versus Semiconductor Energy Laboratory, Limited*.

Will counsel please note your appearances for the record?

MR. BROWN: Good morning, Your Honor. Brandon Brown for Amperex. With me is Mr. Lindsey Shi, Ms. Yimeng Dou, and our local counsel, Craig Reilly.

THE COURT: Good morning to all of you.

MR. DAVIS: Good morning again, Your Honor. Ahmed J. Davis from Fish & Richardson on behalf of Declaratory Judgment Defendant SEL. I have with me my partner, Christina Brown-Marshall, who will be presenting the technical tutorial this morning on our behalf.

THE COURT: And good morning to both of you. So, in terms of our order, I think it makes sense to start with SEL in this case.

MR. BROWN: We agree, Your Honor, and we discussed that beforehand.

THE COURT: Wonderful. Glad you all had agreement on that.

MS. BROWN-MARSHALL: Good morning, Your Honor.

THE COURT: Good morning.

MS. BROWN-MARSHALL: Thank you for having us. I have this

1 opportunity to come before you and explain a little bit about the
2 technology that underlies SEL's patent that's at issue in this
3 case.

4 I have hard copies of the slide dec.

5 THE COURT: Okay. Wonderful.

6 MS. BROWN-MARSHALL: And I will note that we made a couple
7 of changes in the live version after these were printed. So,
8 after the hearing this morning, we will send updated copies via
9 PDF, so you'll have a copy.

10 THE COURT: Do you have a second set for my clerk?

11 MS. BROWN-MARSHALL: So, as Mr. Davis explained, we're
12 here on behalf of Semiconductor Energy Laboratory Company or SEL.
13 Next slide, please.

14 So, SEL has a long history of innovation in the
15 electronics field. It was founded in 1980, and since then it has
16 won awards and patents for its innovative technology that it has
17 developed through its research.

18 THE COURT: I'm sorry. I'm sorry. If you could hold one
19 minute. Judge Vaala, do you have a copy?

20 JUDGE VAALA: I don't.

21 THE COURT: Could you please provide a copy? Okay. Thank
22 you.

23 MS. BROWN-MARSHALL: SEL currently conducts research in
24 three areas. So. One is semiconductor technology; the other is
25 rechargeable batteries; and the third is electronic displays such

1 as OLED displays.

2 Now, the current case involves a patent in that second
3 category, which is rechargeable batteries.

4 And, as you see, there's one SEL patent that's asserted in
5 this case. It's the '828 Patent, which is titled positive
6 electrode active material, including lithium cobaltate, coated
7 with lithium titanate and magnesium oxide. And this patent is
8 focused on the chemical structure of one part of a lithium-ion
9 rechargeable battery, and it was an innovation by SEL to help
10 improve the performance of those lithium-ion batteries.

11 And the problem that the SEL inventors were trying to
12 address is a problem that I think we've all encountered. You buy
13 a device like a cell phone that has a rechargeable battery in it.
14 When you first use it, it's great. The battery will hold a
15 charge for a long time. But, as you use it and reuse it and you
16 charge and discharge that battery, that performance starts
17 degrading, and you notice your battery doesn't hold a charge as
18 long as it used to. You have to recharge more frequently.

19 So, that was the problem that the SEL inventors were
20 really taking a hard look at and saying, how can we make the
21 performance of these batteries better?

22 And the inventors, who are a group of engineers and
23 scientists at SEL, tackled that problem. So, today what we're
24 going to cover is -- we'll talk a little bit about the structure
25 of lithium-ion batteries and some of the structural causes of

1 that degradation problem that the SEL inventors were trying to
2 address. We'll also talk about the innovation that they
3 developed and how they developed a certain structure for
4 components of these lithium-ion batteries that improved that
5 performance and actually accomplished that.

6 And then, finally, we're going to talk about some testing
7 techniques. So, in this case, you're going to see a lot of
8 scientific data. There's a lot of testing of the structure of
9 these batteries involved, so I'd like to give you a little bit of
10 an overview of some of those techniques that you will see so that
11 you'll be familiar with that data as we see it as the case
12 progresses.

13 So, next slide, please.

14 So, this is an illustration of the basic components of a
15 lithium-ion battery. And one thing to point out with these -- so
16 these are lithium-ion rechargeable batteries, so these are ones
17 that you can use and recharge; not the batteries, you know, that
18 you might use in a flashlight, and you use it once and dispose of
19 it.

20 They get their name by the fact that the batteries store
21 energy through the movement of lithium ions, which is positively
22 charged lithium atoms. And the way they do that is the movement
23 of these lithium ions back and forth from the two electrodes in
24 the battery.

25 So, you have the cathode, which is the positive electrode

1 side of the battery, and you have the anode, which is the
2 negative electrode side of the battery.

3 In-between those and connecting those is an electrolyte
4 solution. This is typically a fluid, and this is the medium
5 through which those lithium ions move back and forth as they're
6 shuttled between the cathode and the anode.

7 The other main component, there's a separator involved
8 that separates the cathode from the anode, and it keeps the
9 battery from shorting out. But that separator is a course
10 material, so it allows the lithium ions to move back and forth
11 between the cathode and the anode as the battery is charged and
12 discharged.

13 Next slide, please.

14 So, how does this work? So, we have a back-and-forth
15 charge and discharge process. When the battery is not charged,
16 the lithium ions are found on the cathode. So, common materials
17 for the cathode involve lithium cobalt oxide, so you'll hear us
18 refer to lithium cobalt oxide batteries, and sometimes that's
19 abbreviated as LCO, lithium cobalt oxide.

20 So, when the battery is charged, as in this cycle you see
21 here, those lithium ions move from the cathode through the
22 electrolyte to the anode. At the same time, you'll see that
23 there's electrons that move from the cathode, through an
24 electrical circuit, over to the anode. And, when those lithium
25 ions have moved over to the anode, charge is stored, so your

1 battery is all charged up.

2 Now, when you want to discharge the battery, which we'll
3 see in the cycle here, the process just reverses itself. Those
4 lithium ions move back through the electrolyte to the cathode,
5 and those electrons move from the anode to the cathode, and
6 that's what powers your device.

7 And, as I mentioned, these are rechargeable batteries so
8 this cycle can happen over and over as many times as you charge
9 and discharge the battery.

10 Next slide, please.

11 So, the '828 Patent is focused on the structure of the
12 cathode material. So, we can kind of ignore the anode side of
13 the battery for now, because the cathode is what we're going to
14 be focusing on for this case. And the cathode structure, there's
15 a current collector, and on that current collector is a layer of
16 cathode material, which the patent refers to as positive
17 electrode active material, and that positive electrode active
18 material is made up of particles, and those particles are affixed
19 to that current collector.

20 And, as I mentioned, the most common material used for
21 these positive electrode active material particles is lithium
22 cobalt oxide. So, these particles are composed of a
23 three-dimensional lattice made mostly of lithium cobalt and
24 oxygen, but there can also be small amounts of other elements
25 that are also doped into those particles. So, you'll see that

1 there's some magnesium, or maybe some titanium, or aluminum that
2 are present in small concentrations.

3 THE COURT: Where is this located?

4 MS. BROWN-MARSHALL: I'm sorry?

5 THE COURT: Where is this located?

6 MS. BROWN-MARSHALL: So, this is on the cathode. So, if
7 you see the cathode, it looks like it's kind of like a sheet kind
8 of. So, on that sheet is a layer of these particles, and this is
9 actually an image of those actual particles, and they're held
10 together with a binder that affixes them to that sheet.

11 THE COURT: Okay.

12 MS. BROWN-MARSHALL: So, as I mentioned before, these
13 lithium cobalt oxide particles have lithium in the structure.
14 And the way that the charging and the discharging happens is,
15 when the battery is charged, those lithium ions are extracted
16 from those particles. So they're pulled out of that three-
17 dimensional structure, and then again, when the battery is
18 discharged, the lithium ions move back into the particles.

19 So, the charge and discharge process, these ions are
20 coming in and out of these small particles, and that movement in
21 and out can actually weaken the structure, because you're kind of
22 pulling these out and pushing these back into that
23 three-dimensional structure, and that weakening of the structure
24 can lead to decreased performance of your battery.

25 Next slide, please.

1 So, another source of performance degradation in these
2 lithium-ion parties is interactions with the electrolyte.

3 So these particles are surrounded by electrolyte because
4 the lithium ions need to move through the electrolyte back and
5 forth from the electrodes. But the electrolyte can actually have
6 a chemical reaction with the surface of these particles, and what
7 can happen is it can degrade the surface. And in some cases it
8 can even start dissolving the cobalt out of the particle. And
9 when that happens, it moves to the anode, and then you see
10 decreased performance of your battery.

11 So, interaction with the electrolyte is not a good thing.

12 Now, at the time of the invention, it was known that you
13 could coat the outer surfaces of these particles with a
14 protective coating, and what that coating could do is it could
15 form a barrier where it would prevent the electrolyte from
16 reacting with the particle, but it would also allow those lithium
17 ions to move in and out through the barrier.

18 So that was one idea that was at play at the time of the
19 invention.

20 Next slide, please.

21 Now, one drawback of these coating materials that the
22 inventors identified is they didn't do a good job dealing with
23 cracks in the particles. So you can see in the illustration on
24 the left, you can see that we have the green layer, which is the
25 coating on the outer surface, but in the crack that's formed in

1 the lower part of the particle, there is no coating on the walls
2 of the crack.

3 And these cracks are fairly common in these particles.
4 These particles are under stress, both during the manufacturing
5 process and as part of the charge and discharge process, and this
6 stress can cause the particles to crack or break.

7 And when it does that, it exposes new areas along the
8 crack walls which can now interact with the electrolyte, and now
9 you have the degradation problem that was seen on the uncoated
10 particles.

11 Now, the inventors had the idea that, if you could coat
12 the walls of the particle -- of the crack, too, along with the
13 outer surface of the particle, then you could prevent that
14 electrolyte from interacting and degrading the walls of the crack
15 and, therefore, you could preserve some of that performance of
16 your particle.

17 And, in response to this, they developed a coated
18 particle, which you can see, this is an annotated version of
19 Figure 1-C from the patent. And they developed this particle
20 that used magnesium and fluorine, along with titanium, to coat
21 the particle, the outer surface of the particle, but also to coat
22 the walls of the crack.

23 And if we could go to the next slide, please.

24 And here's just an expanded version of that Figure 1-C.
25 And you can see that the walls of the crack here have been coated

1 with this protective coating so they're not exposed to the
2 electrolyte the way that the particle with the previous outer
3 surface coating was exposed.

4 All right. Next slide, please.

5 So, how did the inventors do this? The specification of
6 the '828 Patent describes one method by which they created this
7 coating where you could coat both the outer surface and the walls
8 of the cracks. And what they did is they started with a
9 commercially available particle -- and this is represented in
10 Figure 5-A.

11 And this commercially available particle had low levels of
12 magnesium and fluorine in the bulk or the interior of the
13 particle. So there's low levels of magnesium and fluorine that's
14 just kind of randomly present in low levels in the interior or
15 the bulk of the particle.

16 And what they did with this first available particle is
17 they added a titanium coating to the outer surface of the
18 particle. So that's going to be your supply of titanium.

19 And then the inventors figured out that, if you heat these
20 particles that have been coated with this titanium solution at a
21 specific temperature in time, that you can cause the magnesium
22 and fluorine that are at low levels within the interior of the
23 particle to move outward, to migrate outward towards the surface.
24 You can also, at the same time, you can cause the titanium to
25 migrate inwards from the outer surface to just below the

1 magnesium and fluorine level.

2 A couple of thing to point out with this. So, when we say
3 that there's a protective layer of magnesium and fluorine, it's
4 not a hundred percent magnesium and fluorine. What it is is that
5 you've enriched the magnesium and fluorine level in that cobalt
6 oxide structure so that you have higher levels of magnesium and
7 fluorine present at the outer portion than were present in the
8 interior of the particle. And the way that the patent refers to
9 this, it talks about a nonuniform distribution of magnesium and
10 fluorine, and it uses the term "segregation" to refer to that
11 non- --

12 THE COURT: I'm probably going to need you to say all of
13 this portion again to make sure I'm tracking on it.

14 MS. BROWN-MARSHALL: Okay.

15 THE COURT: I want you to start back to when you're
16 talking about the different layers or the different levels of the
17 fluorine and -- did you say magnesium?

18 MS. BROWN-MARSHALL: Um-hmm.

19 THE COURT: And you said that, if you keep it at a certain
20 temperature, what moves to the outward? That's what --

21 MS. BROWN-MARSHALL: So, you start off. There's magnesium
22 and fluorine at low levels --

23 THE COURT: Okay.

24 MS. BROWN-MARSHALL: -- kind of randomly interspersed in
25 the interior of the particle. So, it's just kind of all over,

1 but it's at low levels, and it's --

2 THE COURT: -- in the interior. Okay.

3 MS. BROWN-MARSHALL: So, after they apply the titanium
4 solution and they heat, under certain parameters -- so certain
5 temperatures certain times -- they would see that the magnesium
6 and fluorine will migrate outwards. So, they will move from the
7 interior of the particle, and they will enrich that outer layer
8 of the particle, and that forms that sort of protective barrier.

9 THE COURT: Okay.

10 MS. BROWN-MARSHALL: Does that answer --

11 THE COURT: And then you said something about something
12 moving in?

13 MS. BROWN-MARSHALL: So, the titanium -- so as the
14 magnesium and fluorine are moving outward, the titanium is coming
15 inward.

16 THE COURT: Okay.

17 MS. BROWN-MARSHALL: You'll see there's the blue layer and
18 that kind of gold layer that correspond to those two layers in
19 Figure 1-C that you can see in the bottom left-hand corner of the
20 slide.

21 So, this was the concept of the forming of the protective
22 layer that's described in the patent.

23 And if we go to the next slide.

24 So, when the inventors actually analyzed these particles
25 that they had developed, you can actually see this concept in the

1 data that they collected from the actual particles.

2 So, on the left-hand side, this is an image of one of the
3 prior art commercially available particles, and this is called a
4 C-20F particle. So this was what was just commercially available
5 at the time. And you can see that the grayscale image on the
6 left -- this is a cross-section of a particle.

7 So, if you could think of taking one of those particles
8 and cutting it in half so that you could see the cross-section,
9 the surface of the particle is there at the top, and you can see
10 the white crack that goes down into the body of the particle
11 there.

12 And what the inventors did was they tested different areas
13 of the walls along the crack, and we can see -- you see the red
14 circle around number 3. So this is a blow-up of what they saw
15 when they analyzed that portion of the crack wall, and you can
16 see from the figure labeled 3, magnesium, this is a map of the
17 distribution of magnesium in this prior art particle. And you
18 can see that this concept that we talked about before that talked
19 about there's magnesium, but it's at a low level, and it's just
20 sort of randomly scattered throughout the cracked wall.

21 Now, on the right, we see the data that they collected on
22 one of the particles that went through their process that they
23 described. Again, there's the cross-section of the particle.
24 There's Circle 3, which is a section of the cracked wall, and now
25 you can see that the magnesium distribution and this particle

1 looks very different. Instead of just the randomly disbursed
2 magnesium, you see that there's actually a concentrated line of
3 magnesium along the wall of the crack, and that's that enrichment
4 concept that we talked about where the magnesium has migrated and
5 has segregated along the crack wall.

6 And then in the -- you know, further deeper into the crack
7 all, you see a lower level of magnesium because that magnesium
8 has moved and enriched itself along the crack wall.

9 Next side please.

10 And the inventor didn't just see this when they looked at
11 the particle itself, they actually saw an improved performance
12 as a result of forming this enrichment of magnesium and
13 fluorine. And, so, what they did was they created sample
14 batteries. So, they took this cathode material or positive
15 electrode material that they developed, and they put it into
16 actual batteries, and they tested those batteries.

17 So, we could see sample one is a battery constructed with
18 the cathode material that goes through the process that we
19 talked about that has this enrichment of magnesium and fluorine.

20 Sample five is just that commercially available particle
21 that had the sort of low levels of diffused magnesium and
22 fluorine throughout the particle. And when they tested those
23 batteries that had those two cathode materials in them and they
24 cycled the battery 50 times, they saw over 5 percent better
25 performance in the battery that used the particle that they

1 developed with the magnesium and fluorine enrichment.

2 And now, 5 percent improvement may not sound like a whole
3 lot, but this is over 50 cycles, and a normal cell phone battery
4 that's going to be charged and discharged and cycled hundreds of
5 times. So, you can imagine that this 5 percent increase is even
6 bigger as you extrapolate out towards more and more cycles as
7 you would actually use one of these batteries in, say, your cell
8 phone.

9 So, this concept of having this magnesium and fluorine
10 enrichment as a protective layer is captured by Claims 1 and 4
11 of the '828 Patent.

12 And, Your Honor, I'd like to draw your attention to one
13 limitation which sort of encapsulates this concept about coating
14 the crack walls that we talked about.

15 So, Claim 1 requires, wherein the representative element
16 and the fluorine, and Claim 4 just makes clear that the
17 representative element was magnesium. So this is where we're
18 talking about magnesium and fluorine are present in a crack
19 portion observed from a TEM image and the positive electrode
20 active material particle.

21 So, part of the analysis that's going to be involved in
22 these claims is actually looking at that distribution of
23 magnesium and fluorine. So, how do we go from a cell phone
24 battery to looking at the distribution of specific elements in a
25 crack in a tiny particle?

1 So, I'm going to walk you through some of the testing
2 techniques and sort of show you how we're going to arrive at
3 that information.

4 And I will note that in these next few slides I've
5 included images from SEL's expert report. These are just
6 illustrative. I just wanted to show you just sort of what the
7 techniques are and what the types of data that you'll be seeing
8 that are coming out of these techniques.

9 THE COURT: Before we go there -- I'm back on page 15 -- I
10 just want to be clear. For Sample 1, the LiCoO₂, what is that?

11 MS. BROWN-MARSHALL: That's the lithium cobalt oxide.

12 THE COURT: Okay.

13 MS. BROWN-MARSHALL: So that's the main components of the
14 particle, and then it has magnesium and fluorine that are in the
15 particle.

16 THE COURT: Okay. That's the particle that's on the wall
17 of the cathode?

18 MS. BROWN-MARSHALL: Yeah. So, if we go back to the slide
19 beforehand -- so sample one is starting with that prior art
20 particle on the left, and then they do the titanium coating, and
21 then they heat under those specific parameters.

22 So, basically, it's comparing a battery made with a
23 particle on the left, which is Sample 5, to a battery that's made
24 with a particle on the right, which is Sample 1.

25 Okay. So we're going from a cell phone battery all the

1 way to looking at the distribution of elements along a crack wall
2 and these tiny particles. So how do we get there? So the first
3 thing that happens is the battery is deconstructed, and you
4 expose that layer of these positive electrode active material
5 particles -- and this is the image that's shown in Figure A, so
6 using a technique that's called a scanning electron microscope,
7 images are taken of that layer of particles. And we're going to
8 use that to look for particles that have a crack in them, so we
9 want to look at the crack, right?

10 So you'll see in Figure A there's a particle that's
11 identified that has a crack in it, and that red rectangle sort of
12 outlines a slice we want to take out of that particle.

13 So I sort of think about this as you have a loaf of bread,
14 and you want to take a slice out of the middle that has a certain
15 feature that you want to look at, which here is the particle.

16 So how do we do that? So, the first thing that you do is
17 that you add a protective coating over that slice that you want
18 to take. You can imagine these are very thin slices, and they've
19 got cracks in them, they're very fragile. So we're going to put
20 a protective coating over it to kind of hold those pieces in
21 place.

22 And then what you do is that you use a focused ion beam,
23 also called a FIB, and this uses a beam of ions, in this case
24 gallium, and what you're going to do is you have your protective
25 coating down where you want to take your slice, and you're going

1 to use this beam, and you're going to etch, and you're going to
2 create trenches on either side of that slice so that all that's
3 left standing is that slice that you want to look at.

4 So, after you etch out the sides and you create these
5 trenches, you affix a holder to it, and then you lift out your
6 slice of bread, and that's going to be your cross-sectional
7 sample that they are going to look at.

8 Next slide, please.

9 So the image on the left, this is an image of a different
10 particle. We've taken the SEM image, and we've cut out our slice
11 of bread, and then you turn it sideways so that you're looking at
12 the cross-section.

13 And now, for the cross-section, we're going to use a
14 different technique. This is a scanning transmission electron
15 microscope or STEM, and what the STEM does is it uses a focused
16 electron beam to image that cross-section so we can see the walls
17 of the crack, we can see what those features look like.

18 One thing to note -- so Claim 1 requires that the crack be
19 seen from a TEM image, T-E-M. STEM is just another form of TEM.
20 So we can kind of use those interchangeably.

21 So now we've looked at the cross-section, we've identified
22 the crack, we've seen where the wall is. Now we want to look at
23 the distribution of elements, because we want to figure out
24 where's the magnesium, where's the fluorine.

25 So this is going to use a different technique. This is

1 called energy dispersive x-ray spectroscopy or EDX for short.
2 And what EDX can do, is it can measure the relative abundance of
3 various elements at a point on a sample.

4 So we can look at a point and we can say, okay, how much
5 magnesium is there versus how much fluorine versus how much
6 cobalt. And what you can do with this technique is you can
7 actually look at a two-dimensional area, and you take the beam,
8 and it goes back and forth and collects that data across that
9 two-dimensional area, and it creates a map. And so, on the
10 left-hand side, you can see where that yellow rectangle is.
11 These are maps of various elements as they're found in that sort
12 of yellow rectangle.

13 The other thing you can do with EDX data is that you can
14 use it to create a graph and look at the relative concentration
15 of the different elements as a function of depth.

16 So we start at the surface of the particle, and as we go
17 deeper, we look at the relative distribution of these different
18 elements which can tell us, you know, how does the magnesium
19 concentration look up here close to the surface versus 10
20 manometers deep, 20 manometers deep? How does that compare to
21 the magnesium, to the fluorine, to the titanium? And that's what
22 those graphs are going to show us.

23 So this is kind of the set of data that we'll be looking
24 at and the types of data we'll be looking at related to Claim 1
25 and Claim 4.

1 Next slide, please.

2 So there's a third asserted claim from the '828 Patent,
3 which is Claim 2.

4 Now, Claim 2 gets at a slightly different feature of these
5 particles. This one looks at the relative concentration of
6 titanium to cobalt at the surface of the particle.

7 And Claim 2 requires that this is measured using XPS
8 analysis.

9 Next slide, please.

10 So XPS is x-ray photo electron spectroscopy, and this is a
11 technique -- so before we were talking about EDX; we were talking
12 about looking at specific areas, and, like, one particle, one
13 slice, one rectangle. This is what it looks like at that point.

14 This technique is a little bit different. This actually
15 looks at a set of molecules -- or a set of particles, and it
16 measures the relative concentration of different elements across
17 the surface of that collection of particles.

18 So what this can do is it can measure the concentration of
19 titanium, of cobalt, of the different elements, whatever you're
20 interested in measuring, and from that you can calculate a
21 relative concentration of titanium to cobalt, which is what's
22 required by Claim 2.

23 THE COURT: Okay.

24 MS. BROWN-MARSHALL: So that's the type of data that
25 you'll see in relation to Claim 2, that sort of universe of data

1 that you can expect to see in this case. And I guess, if you
2 have any questions about the testing techniques or any of the
3 background, I'm happy to take those.

4 THE COURT: And so it's different testing techniques
5 depending on which claims we're looking at?

6 MS. BROWN-MARSHALL: Yes, Your Honor.

7 THE COURT: So this claim is -- and then for Claims 1 and
8 4, it's the multiple -- it's the EDX that you're looking at?

9 MS. BROWN-MARSHALL: Yeah. So claims 1 and 4, it's that
10 sort of progression of techniques.

11 THE COURT: And that one's just focused on the movement of
12 the magnesium to the outer -- outer surface?

13 MS. BROWN-MARSHALL: Right. So it's -- Claim 1 is looking
14 at the magnesium and fluorine distribution along the crack walls.

15 THE COURT: Okay. But it's only the magnesium that moves
16 out to the surface?

17 MS. BROWN-MARSHALL: No. The magnesium and the fluorine
18 move together.

19 THE COURT: Okay. In that one image, it only focussed on
20 the magnesium though.

21 MS. BROWN-MARSHALL: Yeah. And so, in the patent, the
22 inventors, their data was looking at magnesium. The fluorine can
23 be a little tricky to test, but the experts were able to measure
24 the fluorine distribution, too.

25 THE COURT: Okay. Are you done?

1 MS. BROWN-MARSHALL: I'm finished. Thank you.

2 THE COURT: All right, Mr. Brown, you're up. Thank you.

3 MR. BROWN: Your Honor, we have a few copies of slides to
4 hand out.

5 THE COURT: I should have asked Judge Vaala, did you have
6 any questions?

7 JUDGE VAALA: {Indiscernible}.

8 THE COURT REPORTER: I'm sorry?

9 THE COURT: She was just saying -- okay.

10 MR. BROWN: It's never fun to do the second tutorial
11 because you don't know what's coming. So, you know, Your Honor,
12 we, not surprisingly -- I think we are generally in alignment on
13 how battery -- lithium-ion batteries work. I'm going to teach a
14 little bit more of that just to add color to some of the details
15 that I heard questions about, but I'll try not to redo anything
16 that Ms. Brown-Marshall explained. We do deviate a bit on what
17 the patent actually teaches, and I'll get to that --

18 THE COURT: Okay.

19 MR. BROWN: -- as you might have imagined.

20 So let me just start with setting the context for what
21 we're talking about. The lithium-ion batteries in this case are
22 largely the ones that are in cell phones. Lithium-ion batteries
23 are everywhere. This case is about mostly the ones in cell
24 phones.

25 My client, Amperex, I always get questions like, what is

1 this company that you're representing? And I always joke that
2 it's the one of the most influential companies that you've never
3 heard of.

4 So their batteries are in a large amount of Apple iPhones,
5 Samsung smartphones. Statistically, more than 50 percent of this
6 room is interacting with Amperex battery during every day, either
7 the phone, or a tablet, or in a laptop.

8 But even if you open up the battery and look, you can't
9 even -- there's no branding. It doesn't say Amperex on it. It
10 only says Apple. That's the only way you really know that
11 Amperex is behind the scenes on this. And they spend a
12 phenomenal amount of time on research and development, as you
13 might imagine. There are so many components in a lithium-ion
14 battery that are critical to making it function well, to having
15 high capacity, high energy storage, and every year this company
16 has to come out with a better battery because Apple comes out
17 with a better phone and wants better capacity and wants to talk
18 about charge. And so it's a constant cycling of research and
19 development that these companies are going through.

20 That's just to put in context that the coatings that we're
21 talking about here, which we'll spend more time on in a minute,
22 are really just a tiny fraction of what's happening in the
23 batteries, in terms of improvement.

24 So I'm going to skip forward just to set the stage a
25 little bit for the graphics that I have.

1 There are four major components to a lithium-ion battery.
2 You have the cathode, which is the positive electrode; the anode,
3 the negative electrode, and then the electrolyte, and then a
4 separator.

5 And as counsel correctly said, this case is about the
6 positive electrodes, about that blue on the left and the
7 particular material that's being used to create that battery.

8 There was mention about this lattice structure. I'm going
9 to just show this a little bit. Lithium cobalt oxide is this
10 component that has been used in lithium-ion batteries for many,
11 many years, several decades at this point.

12 And it's LiCoO₂, which means lithium -- one lithium, one
13 cobalt, and two oxygen. That's what the O₂ is. So every time
14 you see LiCoO₂, that's this very old school, well-founded
15 technique for creating lithium-ion batteries.

16 And it creates this lattice structure, and I'll talk about
17 why that is important in a second.

18 But just for context for the other things that are in
19 there, as counsel mentioned, sometimes this material is doped;
20 they add these other metals. The word "dope" means injected
21 with, sort of -- it's sort of mixed in there, and I'll talk about
22 how that happens in a second -- and they're usually what we call
23 transition metals or representative metals.

24 Now, if you remember back to High School chemistry --

25 THE COURT: I don't.

1 MR. BROWN: I don't either. That's why I have slides on
2 it and much smarter people with me. The periodic table -- this
3 is a periodic table for elements. It has all nine elements that
4 we're aware of. And the elements that are in that box in the
5 middle there are transition metals. There are certain metals
6 with certain characteristics that, in cases of lithium-ion
7 batteries, are good for applying coatings to batteries, for
8 instance.

9 Also, on the -- the representative element refers to most
10 of the other parts of the periodic table, which I've highlighted
11 in green here on Slide 12.

12 And so when the patent talks about representative elements
13 or transition metals, you look to these particular parts of the
14 periodic table to find out whether or not you're using one of
15 those metals.

16 THE COURT: And why does that make a difference, if it's
17 representative versus --

18 MR. BROWN: So, it does -- for the purposes of this case,
19 it actually really doesn't, but there are different
20 characteristics of these metals -- and I'll talk about it in the
21 context of lithium in a second -- that make them able to either
22 hold onto their ions and protect, or release the ions, in the
23 case of lithium, so that they can be used for power generation.

24 So let me skip forward to that, actually. So lithium
25 ions, lithium-ion batteries are -- stem from this idea that

1 lithium has a special characteristic. Lithium is the third
2 element on the periodic table, meaning that it has -- I thought I
3 heard disagreement -- and it has these three ions that are
4 circulating around the core of lithium, right? You see two in
5 the middle inner circle and then one on the outside. And it's
6 that special one on the outside that makes lithium a particularly
7 good metal for power. And this was discovered, I think, about 40
8 years ago by a gentleman named Putanon {ph}.

9 If you actually look at the front of the patent, you can
10 actually see his patent from '81 cited as the first reference.
11 He got a Nobel Prize for this. He learned that lithium is really
12 good at releasing its ion.

13 And so the idea is that that ion can be pulled away and
14 stored somewhere else, attached to a different lithium on the
15 other side and then released under certain characteristics and in
16 that way what you're doing is essentially charging and
17 discharging the battery, as counsel explained, a little bit like
18 pumping water up a well -- up to the top of the damn and then
19 releasing it.

20 So when you charge, you're pumping all of the water up to
21 the top of the damn, and then when you want to use your battery,
22 you're letting all the water go down, and it's sort of running
23 the energy in the battery, and that's really what these ions are
24 doing, moving back and forth there.

25 So it looks a little bit like this. There was a similar

1 animation, but what you're seeing is that when you're in the
2 process of trying to charge your battery, all the ions are moving
3 from the cathode side -- I'll play it one more time -- over to
4 the anode side, and they're being stored on the anode side until
5 the battery is actually ready to be used.

6 And once that happens, they slowly start to go back to the
7 cathode side. And what that does is causes power generation to
8 happen, so the battery starts to actually share electricity back
9 with the circuit that it's connected to.

10 And as I sort of mentioned, this is a little bit like
11 storing energy in a damn. You're moving all the ions up to the
12 top of the damn so you can use it when you need the power. And
13 when you need it, you let them flow down, and that generates --
14 there's a turbine in the case of the damn that generates the
15 power for you.

16 So this case is about this particular component called a
17 positive electrode active material, and what this starts out as
18 is a literal powder. It's a black powder that has lithium cobalt
19 oxide in a structure we talked about, and then it may also have
20 things like magnesium and titanium mixed in.

21 And these companies spend a lot of time trying to figure
22 out exactly how much to use and what elements to use, and just a
23 lot of research and development goes into that selection.

24 And what that looks like is what I have on the screen here
25 on slide 20. This is an SEM image, which counsel spoke about

1 briefly. And what this shows is a zoomed-in nanoscale level look
2 at all of the different particles that are in this powder. And
3 so, if we zoom in a little bit -- I zoomed in on slide 21 to --
4 the one that I've circled on slide 20. You can actually see the
5 particle, right? It's this -- it's this -- there -- I mean,
6 there's a bunch of particles, but I circled one, and it's this
7 sort of condensed structure of lithium cobalt oxide and all those
8 other elements, and it forms this sort of what they call
9 particle -- almost like little rocks that are sort of floating --
10 either floating in electrolyte, or during manufacture they're
11 just sort of sitting here dry and ready to be continued to work.

12 And so what I've highlighted here is the blue, one of the
13 particles and then you can see, even during manufacture, there
14 are occasionally cracks in that particle. I've circled that in
15 red. This is from our expert report. This is an iPhone 7, which
16 is prior art to this patent, and you can see that there's a
17 particle with the crack in it.

18 And I'll get to that in a second. What happens next is
19 that there's coatings that are applied. This has been going on
20 for ages, and the coating is applied to the outside, and I'll
21 show you how that works in a second.

22 And so I'm going to skip forward a little bit. Actually,
23 I'll start here. So we talked about cracks. Cracks are not a
24 new thing. Cracks have been forming in battery particles
25 forever, including in that prior art battery that we were just

1 looking at. And the cracks that we're focused on in this case
2 are not the ones that are happening when you're using your phone.
3 The ones in this case are supposed to be the ones that happened
4 during manufacturing, because the whole process that was taught
5 by counsel is a manufacturing step. So the cracks have to exist
6 at the time of manufacturing in order for that coating to get in
7 there.

8 So this patent is really about a manufactur- -- well, the
9 way that it was described, this patent is about a manufacturing
10 step that is coating the cracks that exist at the time of
11 manufacture.

12 And so what happens is you have these cracks. The
13 fluorine -- the reason you don't like the cracks is because the
14 fluorine, which is in the electrolyte, that electrolyte that we
15 talked about earlier that had all these particles that are
16 floating in, has -- it's a -- it's a fluorine solution, and
17 fluorine gets into those cracks because it's an open cavity in
18 the particle, and so the liquid flows into them.

19 So there's fluorine inside of the cracks. Once it gets
20 into the cracks, that can be bad because it will cause -- the
21 lithium will get leached out a little bit by the fluorine, and it
22 kind of creates -- it actually creates a hardened shell around
23 the cracks, but ultimately reduces the battery rechargeability,
24 because you don't want that lithium kind of getting out of the
25 particles. You want it to stay inside.

1 And so, for decades, the industry coats these particles.
2 So they will apply a coating to the surface in order to add a
3 little bit of a protective shell.

4 And you have to be careful about how much of a protective
5 shell you add, because, if you coat it too much, you kind of lock
6 it up; then the ions can't get out, and you can't use the
7 battery. So you have to kind of optimize what kind of coating
8 you need. And once you have a coating, though, then it protects
9 the lithium from leaking out, and the fluorine sort of stays sort
10 of in the cracks but doesn't interact with the particle itself.

11 So the way that that happens is -- the way that that
12 coating gets on there happens in a number of different ways. The
13 patent itself -- and this is where we start to differ a little
14 bit from the way counsel explained the patent.

15 The '828 Patent talks about on the title that it's a --
16 it's a particle that's coated with a couple of elements. And
17 then it describes at least three different types of coating that
18 might work, and that's 102, 103, and 104 in the Figure 1-C, which
19 is the same figure that counsel showed.

20 And so I'm going to use this sort of -- this sort of
21 cartoon of a particle to explain the concept. I'll admit that it
22 looks a little bit like Pac-Man. I get it. But, basically, what
23 we're showing here is it's a particle with a crack in it, right,
24 just like the one that we saw in the real image back on slide 20.
25 This is a particle that has a crack in it. And during

1 manufacturing -- and the crack is sort of that -- the mouth of
2 the Pac-Man. And I'm using this because we used this in
3 depositions in this case. I drew something like this in
4 depositions, and so it shows up later in the case and everybody
5 kind of agreed that this is representative.

6 And so there were a number of known coating methods that
7 the patentee admits in the patent. There's this idea of sol-gel,
8 which is, essentially, you take those particles that I showed
9 you, and you dump them in a liquid; you submerge them in a
10 liquid, and the liquid kind of hardens along the outside exposed
11 surfaces of the particle.

12 You can also do what's called a deposition technique,
13 which is essentially showering the particles with the coating
14 that, again, hardens on from the outside, or you can do
15 segregation, which was a known technique at the time of this
16 patent.

17 And what it is is sort of an outside -- inside out
18 coating, right? So the first two are outside in. We're applying
19 something from the outside to the exterior of the surface.
20 Segregation is an inside out. It applies heat, and that causes
21 certain things inside the particle to go out to the coating.

22 And so the patent -- I have on slide 33 -- column 20
23 admits that these techniques were known, and this mentions
24 sol-gel and deposition and a few other methods as well.

25 And SEL, itself, admits that the prior art discusses

1 segregation. So it's -- the patent didn't invent segregation;
2 the patent invented something else, but segregation, this idea of
3 heating something to cause the elements to come out to the shell
4 was known.

5 Here's another reference that discusses that, and this
6 wasn't a secret. SEL was giving references to the Patent Office
7 that actually said the same thing. So this is cited on the face
8 of the '828 Patent, multiple references that talk about
9 segregation.

10 So that was not -- while that is something discussed in
11 the patent, that was not something that the patentee was claiming
12 was their invention here.

13 And hears another -- this is a Sun article that was also
14 cited on the face of the patent.

15 And so, the way that this patent came about was that SEL
16 started with this product that they bought on the market called
17 C-20F.

18 This was made by the Nippon Chemical Industry Corporation
19 or the Japan Chemical Industry Corporation, and it was
20 essentially that black powder, the lithium cobalt oxide that had
21 magnesium fluorine and a few other elements in it. And this was
22 the precursor to batteries. You could actually make a battery
23 out of this.

24 And this was what you called the positive electrode active
25 material.

1 And what they did was they said, well, let's -- let's, um,
2 let's run tests on it. And what they tried to do was say, if we
3 tweak some things in this, do we get better results, right? But
4 even this C-20F -- I'm showing figure 31-B2 and 31-C2 shows that
5 there was already a coating on this battery before it was ever
6 used. So let me set the stage for this.

7 You heard from counsel that Sample 05 on the bottom there
8 is the original C-20F. If you remember, she showed you a chart
9 that compared performance and it compared Sample 01, which
10 counsel represented was the invention, and Sample 5, which was
11 the thing they bought off the market. And so Sample 5 in table 1
12 of the patent says it's lithium cobalt oxide plus magnesium plus
13 fluorine, not heated, right out of the store.

14 And they noted in the patent at column 59 that even this
15 product had an unevenly distributed amount of magnesium and
16 fluorine, which looks a lot like what you saw in the figure that
17 showed the -- what was represented to be segregation, right, that
18 there was movement of magnesium and fluorine to the surface.

19 So there's already magnesium and fluorine pointing at a
20 protective surface on the C-20F. And, in fact --

21 THE COURT: I'm sorry. Can you go back to that last
22 slide. Those figures there, are those the surface, though?

23 MR. BROWN: They're the surface, yeah. Yeah. And so what
24 you're asking is, is it the crack, right?

25 THE COURT: Well, the images in the last presentation

1 showed that when it's unevenly disbursed it's kind of -- it
2 looked more like the top image, and when it is heated in the time
3 and temperature, then it's brought more to the surface in the
4 solid line.

5 MR. BROWN: Yeah.

6 THE COURT: And so is that the lower figure then there?

7 MR. BROWN: Well, so -- actually -- yes, yes it is. The
8 lower figure is probably the better comparison. The lower
9 figure, 31C2, you can see it in the upper left corner of that, is
10 magnesium. See the MGK in the box? So that's the magnesium
11 measurement. And then on the top is the fluorine measurement,
12 which is harder to detect, as counsel said, so that's why it's a
13 little thinner. But the magnesium in the untreated off-the-shelf
14 product has that same uneven distribution.

15 THE COURT: Okay.

16 MR. BROWN: And this is not -- this shouldn't be
17 contestable because SEL's internal e-mails show that they knew
18 that the C-20F -- and you can see it on the line that I've
19 highlighted up three down -- shows that fluorine segregation
20 appears to be seen even before annealing, and annealing here
21 refers to that applying a bunch of heat treatment, right?

22 So they're heating that in C-20F there's already
23 segregation of fluorine happening, and so that's not -- that's
24 not really what the patentee is saying they've come up with here,
25 because they know that already existed.

1 And so what they actually talk about in the patent are a
2 number of different coating techniques. As I mentioned, there
3 are three different coatings shown on the figure; the blue, the
4 green, and then I showed a red earlier as well, and it's 102,
5 103, and 104.

6 In practice, nobody does that. You wouldn't have this
7 much coating on a product because you'd be trapping too much
8 lithium in. But that's what SEL put in their figures, and that's
9 what they describe as their invention.

10 And so counsel focused on the third region, which is the
11 green region, which is in-between two different coatings.
12 There's the blue, 102, and the red, 104, but the other two
13 coatings are also discussed in great detail in the patent.

14 The region 102 is a coating through those methods I talked
15 about earlier, which is through sol-gel or deposition, the other
16 ways of applying sort of outside coatings, so when you just apply
17 the coating to the particles from the outside.

18 And similar to the claim language that counsel put up from
19 Claim 1, the patent says that, column 965, that second region has
20 nothing to do with segregation, is also present in the cracks of
21 the particles. So, if you coat from the outside --

22 THE COURT: Where is the second region on here, on the
23 diagram?

24 MR. BROWN: Yeah, okay. So it's the blue. It's 102. And
25 I -- because we zoomed in, we've lost that annotation. But let

1 me take you back to --

2 THE COURT: So blue is 102?

3 MR. BROWN: Correct.

4 THE COURT: Okay.

5 MR. BROWN: I'm going to show that.

6 THE COURT: And what's 100 and then 103, so that --

7 MR. BROWN: So let me pull back so we can see the whole
8 figure. Can we go to slide 30, please? That will make this
9 easier.

10 THE COURT: Okay.

11 MR. BROWN: So there's the whole figure, right?

12 THE COURT: Okay.

13 MR. BROWN: And so 101 is the kind of core of the
14 particle. That's where all the lithium cobalt oxide is with the
15 ions that you want to store and release.

16 102 is what the patent calls the second region, and I
17 colored that blue throughout my slides, and that has nothing to
18 do with segregation.

19 103, green, is the third region, and that's the part where
20 the patent talks about, you could do segregation or other things
21 to get that.

22 And then 104, I haven't gotten to it yet, but 104, the
23 red, is another layer that shows up in the cracks, and that's
24 actually intended to just fill the cracks, and I'll show you that
25 in a second. Again from the outside having nothing to do with

1 segregation.

2 So, if we go back to 45 -- so, what I've got for the
3 record, what I have on slide 45 is excerpts of the patent talking
4 about that second region, quoting from column 20, line 19 to 30,
5 and column 9 from 65 to column 10 at line 3.

6 And so the second region, that blue region, is a coating
7 that it says is formed by coating particles with a material
8 containing the second transition metal. And what it says it does
9 is it coats it using a variety of options, and it doesn't claim
10 to have invented any of these coating approaches. It says you
11 can coat it with a liquid phase method such as sol-gel; a solid
12 phase method, a sputtering method, an evaporation method, a
13 chemical vapor deposition that they call CVD, or a couple of
14 other techniques, and this is the outside in approach to coating.
15 So you're taking particles during manufacture and you're either
16 submerging them in liquid, or you're spraying them with
17 something, and that's applying this coating.

18 And you could see the patent agrees. It says it. The
19 crack here is 106, and it's actually circled in the figure --
20 it's hard to see in the patent, but there's actually -- there's a
21 dotted line that circles it, and we've highlighted that in yellow
22 here. And it says, this coating, this other coating is also
23 found in the crack.

24 And nowhere does the patent say that the second region,
25 this form by segregation or this outside in sort of approach,

1 this is a different approach that is also found inside of the
2 cracks.

3 And then that fourth region that I spoke about is another
4 technique that they layer on on top of these other techniques,
5 which is the 104. And what the 104 coating is doing is -- again,
6 it's an outside in -- I'm sorry -- yeah, an outside in, just
7 depositing on the particles from the outside another series of
8 metals.

9 And what this is intended to do is sort of pave over
10 cracks. And it says it right there. It says, the fourth region
11 may be present to imbed the defect, such as the crack portion,
12 and that's at column 24 of 57 to 67.

13 And it says that defect -- it allows at 25, 12 to 14,
14 allows that defect to be repaired, so it's filling in the crack
15 with elements to sort of stop the crack from being a problem.

16 Now -- and that's another way the patent discusses how
17 materials get coated and how materials can find their way inside
18 of a crack portion of the battery.

19 And so there's two kinds of techniques we talked about
20 here. There's the second and fourth regions that are described
21 in the patent that apply to coating from the outside, and then
22 there's the technique that we heard about about segregation which
23 coats from the inside; so we cause the elements to go to the
24 coating from the inside.

25 In all cases, the patent is clear that all these coatings

1 get into the cracks. Whether it's a segregation step or its from
2 the outside, everything fills the cracks that exist at the time
3 of manufacturing. And that's not surprising. I mean, I've drawn
4 the figure. It's a big crack. But even if you go back to the
5 slide that I started with on this, which is, I think, slide 20 --
6 21, if you don't mind.

7 If you look at even just a real life crack in the
8 particle -- the particle is circled in blue here, the crack is
9 circled in red -- if you put that in a -- and this is a 3D
10 particle, right? It's kind of like a rock with a crack in it.
11 If you put that in liquid, liquid is going to get into the crack
12 just as much as it's going to get onto the surface.

13 So the -- it makes sense that the patent says that all
14 these other coatings also get into the cracks, because it's
15 just -- that's just how coatings work, right? There's nothing --
16 there's nothing new or interesting about that; it's just when you
17 submerge something, everything gets filled up and cracks form on
18 all exposed surfaces of the particle. That's essentially how
19 this works.

20 And that's not contested either. If we jump back to slide
21 49, SEL's own expert agreed that some amount of material, the
22 coating materials in the prior art also go into cracks.

23 The other interesting thing to note is there's a lot of
24 discussion in the briefing on Markman, at least, on nonuniform
25 distribution, right, this idea of there being more of something

1 at the surface than elsewhere.

2 If we go to the next slide, nonuniform distribution really
3 just means a coating, because whether you're doing the
4 segregation from the inside out or you're applying a coating on
5 top, the whole point is to have that thick layer of a coating.

6 As Your Honor pointed out in the figures that we were
7 looking at, you can tell that there's a coating because there's a
8 thicker line, and that nonuniform distribution again happens
9 whether you do the heating step or whether you do outside
10 coating. They all end up with a shell that is nonuniformly
11 distributed. There's nothing unique about that to the idea of
12 segregation.

13 And I think, if we go to the next slide --

14 THE COURT: I have a question.

15 MR. BROWN: Yes, please.

16 THE COURT: And so, do cracks also form just with repeated
17 use of the battery?

18 MR. BROWN: They do, yeah.

19 THE COURT: Okay. And so none of this technology would
20 impact that, would it? Because if it's -- the heating of the
21 battery or the heating and the temperature, would new coatings
22 form, or could they form, or no?

23 MR. BROWN: No, because the new coating -- so the
24 coatings, at least -- again, the patent isn't about segregation,
25 but at least if we assume it is, the -- that is a -- I think that

1 it's an 800-degree celsius temperature that's required -- your
2 batteries get hot, but not that hot when you're using your phone.
3 So it does -- the coating helps minimize cracks --

4 THE COURT: -- new cracks from forming.

5 MR. BROWN: It helps a little bit but, nothing in the
6 patent is about sort of filling up cracks that have happened
7 during operation.

8 And so, if we -- and so, if we go to the next slide. And
9 again, their expert agrees as well with what I just said about
10 nonuniform distribution, that coating other material -- in the
11 prior art other coatings create a nonuniform distribution of a
12 coating, and that's not a segregation-specific outcome.

13 And then one other point, in part because I feel obligated
14 to use the Pac-Man image that I talked about, if we go to the
15 next slide, this is a drawing -- this is the drawing I made
16 during a deposition with SEL's chairman, former president of the
17 company. And the point here is that, when you're applying a
18 coating, and in this case we're talking about segregation, if
19 there's material that goes -- you find it on the surface, on the
20 outside, it will also be going to the crack.

21 And so the point is that there's really nothing special
22 about it being in the crack, because all the coatings you apply,
23 whether from the inside out or the outside in, end up going on
24 both the crack and the surface, and that's sort of what we're
25 explaining here.

1 So, if there's segregation that happens to this, as you
2 see on the Pac-Man figure, the impurities -- that's what he'd
3 like to refer to it as -- as the magnesium, they go to both A and
4 B, which are inside the crack, and also A prime and B prime,
5 which are outside of the crack but on the surface. And he said
6 most people would understand it that way.

7 And so, any sort of coating that you're applying is going
8 to end up on all the exposed surfaces, whether it's in a crack or
9 whether it's -- you don't call it a crack.

10 Let me jump forward, then, to just a little bit on the --
11 Unless you have any more questions, I was going to switch to the
12 testing, Your Honor.

13 THE COURT: No.

14 MR. BROWN: If we jump forward to 67 -- 66, I'm sorry. So
15 the claims, as we've talked about, require wherein a represented
16 element and the fluorine are present in a crack portion observed
17 from a TDM image, the parties obviously dispute, and we'll be in
18 front of you in a couple of weeks arguing about what present in
19 the crack portion means; if it requires segregation or nonuniform
20 distribution, or something else, but I'm just going to focus --
21 because we're not arguing that now, I'm going to focus on the TEM
22 just to give a little more context here. So this --

23 THE COURT: Tell me again what the TEM is.

24 MR. BROWN: Yeah, absolutely. So it's a transmission
25 electron microscope, and I think it helps to kind of see it and

1 see what it does. So it is a giant wardrobe-like machine that is
2 vacuum sealed and locked up.

3 And what happens here is it -- you take the thinnest slice
4 you can of a battery down to sort of the narrow scale end slice,
5 and you put it inside, and it shoots electrons.

6 From the very top, you can see there's a light there
7 that's shooting the orange electrons down. And what it can do is
8 then, on the very bottom, can detect where all the electrons are
9 coming -- what electrons are making it through, right? So, if
10 you're shooting electrons in like a square, do you get all of the
11 electrons at the bottom, or do you get only some? And what that
12 gives you is essentially kind of like an x-ray of what your
13 actual battery particle looks like, because the electrons that
14 are getting stuck on the particle tell you if there's a particle
15 there, and the electrons that are getting through are showing up
16 on the bottom. So you get this negative image of what's actually
17 happening, and that's what creates the imagery that we've been
18 looking at.

19 Like, if we go to slide 20, this is a TEM imagery of --
20 this is caused by that. So what this indicates is that the white
21 structures are where electrons got stuck and didn't make it
22 through, and the black is where we actually got electrons going
23 through. So we get an imagery at a nanoscale of what's actually
24 happening, what this structure actually looks like. That's all
25 it is.

1 THE COURT: This says S-E-M. Is it the same?

2 MR. BROWN: It is, yes. So, like counsel said, it's -- a
3 scanning transmission electron microscope is the same thing as a
4 transmission electron microscope. So, yeah, we should have said
5 STEM here, but it's the same concept.

6 THE COURT: You all are all used to this terminology, so
7 we're just trying to get up to speed.

8 MR. BROWN: No, absolutely. I hope we helped a little bit
9 on that.

10 THE COURT: Okay.

11 MR. BROWN: And then let me just do one more on -- so --
12 and just, Your Honor, for your own -- there's no dispute, I
13 think, about STEM imagery or -- both experts are running STEM
14 tests. I think there's disputes over whether they've done it
15 right, but nobody is really disputing, you know, what's a STEM,
16 is it the right imagery, that kind of thing.

17 And so the other issue is that other test, the XPS test --
18 and this is on slide 69. So 69 requires that, in order to meet
19 this claim, there has to be a specific concentration of elements
20 relative to one another. So there's two elements, and you take a
21 concentration of those over each other, and it has to be between
22 .05 and .4.

23 So, let me get back into that.

24 If we go to the next slide. And XPS is another large
25 piece of machinery that does something a little bit different.

1 This actually sort of shoots electrons at a sample, and it
2 measures what it gets back. And the speed of which -- this
3 starts to lose me a little, too, but just for context, the speed
4 with which the electrons bounce back tells you what elements are
5 there on the surface. So it's a little bit like sonar in that
6 way.

7 And so what it's measuring is the concentration of
8 elements. And if we go to the next slide, there's two ways to do
9 that. If you remember from chemistry in high school, there's
10 atomic weights for each element. So 6.9 for lithium; 58.933 for
11 cobalt, and this is how much each particle weighs, or you could
12 just count how many particles you see.

13 So, do you either see 200 grams of cobalt, or do you see a
14 little bit under 4 cobalt?

15 And so grams is the wrong measurement, but the general
16 concept is there. So let me make this a little bit easier and go
17 to the next slide, one more slide.

18 An analogy for this that we use is -- and this is how my
19 team helped me to understand it -- is that if you're trying to
20 figure out what's the concentration of what somebody's eating --
21 so Alice -- what's Alice eating versus what Bob's eating? Alice
22 eats a hamburger; Bob eats two apples. The hamburger is
23 500 calories; the apples are each 125, so 250. When we're
24 saying, what's the concentration of the food they ate, it
25 depends. If you're measuring just weight, calories, then it's

1 two to one, right? Alice ate twice as much as Bob. But if
2 you're measuring a number of items, which is what we call atomic
3 measurement, rather than weight measurement, Bob ate one.

4 So Alice ate one to two; one hamburger to two of Bob's
5 apples. So the whole idea here is just that the
6 concentration that you're looking for varies. You have to be
7 clear about, what are you measuring? Are you trying to measure
8 atomic weights, those weights of, in this case, calories, or are
9 you just measuring how many units they ate? That's the sort of
10 question of the concentration issue.

11 Let me pause there. Any questions for me, Your Honor?

12 THE COURT: So, for your -- this ratio, which two
13 transition metals are we looking at, or does that change?

14 MR. BROWN: Yeah. That's a good question. So, if we go
15 back to the slide, it's going to be -- can we go back to the
16 claims? That will be easier to look at.

17 So, it's the ratio of -- it's cobalt to titanium, and so
18 the second transition metal is, I think, defined in Claim 4 as
19 titanium, and then the concentration of the first cobalt
20 transition metal is cobalt. And so we're looking at cobalt to
21 titanium.

22 And any transition metals would work here for the claims,
23 but in this case those are the ones that are being used.

24 Anything else, Your Honor?

25 THE COURT: Well, I'm going to take a quick recess, and

1 then I'm going to come back, and I'll let you all know if I have
2 anymore questions, if you can give me 15 minutes.

3 MR. BROWN: Sounds great. Thank you, Your Honor.

4 (Thereupon, a recess in the proceedings occurred from
5 11:17 a.m. until 11:34 a.m.)

6 THE COURT: Okay. I do have one follow-up question,
7 because I just want to make sure that I'm clear, and I think it's
8 because I'm trying to compare two figures, one that -- from your
9 presentation -- is it Brown-Marshall?

10 MS. BROWN-MARSHALL: Yes.

11 THE COURT: And Mr. Brown.

12 MR. BROWN: Yes.

13 THE COURT: Okay. And so -- and I think it's because, in
14 my mind I'm comparing these two figures, but I don't know if they
15 really should be compared, and it's your slide 39 and then your
16 slide 14.

17 And I just want to be clear. This is what I think I
18 understand, and that is, Mr. Brown, your slide 39, is it
19 reflecting sample 05 or is it reflecting sample 05 and 01?

20 MR. BROWN: It is. According to the text at 59, 1 to 4,
21 it is showing only sample 05. So this is before any of the --
22 anything that the inventor --

23 THE COURT: And so this would be prior art because it's
24 before the heating and the time and temperature?

25 MR. BROWN: Correct.

1 THE COURT: Okay. And then how would you,
2 Ms. Brown-Marshall, if you want to come respond -- because I was
3 looking at your slide 14, which to me is -- it shows both the
4 prior art as well as what is claimed in the patent, correct?

5 MS. BROWN-MARSHALL: Yes.

6 THE COURT: And so, on this side, this is why it is
7 disbursed, the magnesium and the fluorine, correct?

8 MS. BROWN-MARSHALL: Yes.

9 THE COURT: Because then on the -- it's my right -- it
10 would be the -- when it has been brought out to the surface, and
11 so we have more of the clear magnesium line. And your -- this --
12 these two, in your images, it's only the magnesium that is
13 measured here and reflected?

14 MS. BROWN-MARSHALL: Yes, Your Honor.

15 THE COURT: How does it compare to Mr. Brown's?

16 MS. BROWN-MARSHALL: So I think there's an important
17 distinction between Mr. Brown's figure and our figure that we
18 have on slide 14. So slide 14 is looking at the walls in the
19 crack. So you see those -- the grayscale images show you where
20 that data was collected.

21 THE COURT: Okay.

22 MS. BROWN-MARSHALL: The data in figure 31 that's
23 referenced in the patent is looking at just the outer surface of
24 the particle.

25 THE COURT: Is that his 39?

1 MR. BROWN: Correct.

2 THE COURT: Okay. I see. And it's figure 31B2 and 31C2.

3 MS. BROWN-MARSHALL: Yes, Your Honor.

4 THE COURT: And you say that is only looking at what?

5 MS. BROWN-MARSHALL: That's the outer surface of the
6 particle; that's not looking at the wall of the crack.

7 THE COURT: Okay. And so not the walls in the crack. So
8 that's what my question was getting at earlier when I said, well,
9 I see a darker line here, and then I was looking at your -- but
10 it's different portions of the surface, from the crack to, I
11 guess, the overall -- the outer surface?

12 MS. BROWN-MARSHALL: Yes, Your Honor. And we don't
13 dispute that you can put coatings on the outer surface of the
14 particle itself. We're looking at the walls of the crack for the
15 claims.

16 THE COURT: Okay. Okay. Got it. Well, thank you.

17 MS. BROWN-MARSHALL: Thank you.

18 THE COURT: The good news is, I understand this more than
19 when I came in this morning, but I think I still have some
20 studying to do that I intend to do.

21 But I really thank you all, because at least now it makes
22 more sense to me, and I think that was the purpose -- for me,
23 that was the purpose of today before I turn to the actual claim
24 construction arguments, and so I really appreciate this.

25 Now, if you had changes in yours, Ms. Brown-Marshall,

1 please make sure we have -- because I think you said that this
2 live demonstration was a little bit different.

3 MS. BROWN-MARSHALL: Yes, Your Honor.

4 THE COURT: And so if you could make sure that that is
5 with the Court.

6 And then, if you all have copies to be made part of the --
7 because I've written over everything that you've given me, okay.
8 And so, in terms of what we're preserving in the record, please
9 make sure the Court has a copy of that.

10 MR. DAVIS: Good morning again, Your Honor. The one thing
11 I want to just note is there were a number of slides that
12 Mr. Brown used today and some that he didn't flesh up but I saw
13 it in the dec that contained confidential testimony from the
14 deposition.

15 THE COURT: Oh. We will seal -- we can seal them. That's
16 not a problem. Everything can be sealed, so you can file your
17 slides under seal.

18 MR. BROWN: Thank you, Your Honor.

19 MR. DAVIS: So I think Your Honor just answered my
20 question. You do want us to file them rather than just e-mail
21 them to --

22 THE COURT: Don't e-mail them, because that's not part of
23 the official record, right? And what we want to do is make sure
24 that we have a record of what you all have represented in court
25 today, and so that's why I want you to file those, but they can

1 be under seal.

2 MR. DAVIS: Thank you, Your Honor. I have just one issue
3 I want to raise as a procedural issue. We took the Court's
4 urging to heart at the last hearing that we had, and I think
5 Mr. Brown and I have been working collaboratively to try to get
6 to a place where our clients are willing to go before Magistrate
7 Judge Vaala.

8 THE COURT: Oh. Well, that is wonderful.

9 MS. BROWN-MARSHALL: Well, we both smiled when we saw her
10 in the back and then realized she had left. But we -- I'll make
11 this request of you. I think it needs to be directed to her, but
12 the issue is that, as I think the Court is aware, our client is
13 in Japan; their client is in China. And so what would make it
14 much more efficient for us is if we were able to do that
15 remotely.

16 THE COURT: Oh, I think she has done those remotely. I
17 don't think that will be a problem at all. Judge Vaala reached
18 out about sitting in today because she thought it would be
19 helpful for her to have some of this background. She was here
20 for a great portion of it, and she can get the transcript for any
21 portion that she missed, but I think -- how soon are you all
22 going to do this?

23 MR. DAVIS: Well, I was going to say, Your Honor, we just,
24 for scheduling reasons and a number of moving parts, I don't
25 think we're going to be able to get it done before the Markman,

1 but I think we are hopeful that we will be able to get it done
2 not terribly long after.

3 THE COURT: That will be wonderful, because it will take
4 me some time to draft that anyway, in terms of getting it back to
5 you. So that won't be a problem.

6 MR. DAVIS: So, I --

7 THE COURT: You can do the first step, but you all should
8 go ahead and reach out to Judge Vaala's chambers to get it
9 scheduled, but she has done them remotely, so that should not be
10 a problem.

11 MR. DAVIS: Thank you, Your Honor.

12 THE COURT: Okay. Anything further?

13 MR. BROWN: Nothing else.

14 MS. BROWN-MARSHALL: Nothing.

15 THE COURT: Then we're adjourned.

16 (Proceedings adjourned at 11:41 a.m.)
17
18
19
20
21
22
23
24
25

C E R T I F I C A T E

I, Scott L. Wallace, RDR-CRR, certify that
the foregoing is a correct transcript from the record of
proceedings in the above-entitled matter.

/s/ Scott L. Wallace

10/17/24

Scott L. Wallace, RDR, CRR
Official Court Reporter

Date

	213-680-8400 [2] - 2:5, 9 213-680-8500 [2] - 2:5, 10 21st [1] - 2:17 22314 [1] - 1:20 22314-5798 [1] - 2:22 24 [1] - 40:12 25 [1] - 40:13 250 [1] - 47:23 27th [1] - 1:15	69 [2] - 46:18
'81 [1] - 28:10 '828 [7] - 5:5; 8:11; 12:6; 17:11; 22:2; 32:15; 34:8		7
/		7 [1] - 30:15 703-549-2604 [1] - 1:21 703-549-5354 [1] - 1:21
/s [1] - 55:5	3	8
0	3 [4] - 15:14, 16, 24; 39:5 30 [4] - 1:6; 3:1; 38:8; 39:4 30309 [1] - 2:18 31 [1] - 50:22 31-B2 [1] - 35:4 31-C2 [1] - 35:4 31B2 [1] - 51:2 31C2 [2] - 36:9; 51:2 33 [1] - 33:22 3700 [2] - 2:4, 8 39 [3] - 49:15, 18; 50:25 3D [1] - 41:9	800-degree [1] - 43:1
01 [2] - 35:9; 49:19 05 [5] - 35:7; 46:22; 49:19, 21		9
1		9 [1] - 39:5 90071 [2] - 2:4, 9 94104 [1] - 1:16 965 [1] - 37:19
1 [12] - 17:10, 15; 18:10, 24; 20:18; 21:24; 23:7, 9, 13; 35:11; 37:19; 49:20 1-C [4] - 11:19, 24; 14:19; 32:18 10 [2] - 21:19; 39:5 10/17/24 [1] - 55:5 100 [1] - 38:6 1000 [2] - 2:12 101 [1] - 38:13 102 [7] - 32:18; 37:4, 12, 14, 24; 38:2, 16 103 [4] - 32:18; 37:5; 38:6, 19 104 [7] - 32:18; 37:5, 12; 38:22; 40:5 106 [1] - 39:19 10:03 [2] - 1:6; 3:2 1180 [1] - 2:17 11:17 [1] - 49:5 11:34 [1] - 49:5 11:41 [1] - 54:16 12 [2] - 27:11; 40:13 125 [1] - 47:23 14 [5] - 40:13; 49:16; 50:3, 18 15 [2] - 18:9; 49:2 19 [1] - 39:4 1980 [1] - 4:15 1:23-cv-00272-PTG-LRV [1] - 1:4	4	A
	4 [9] - 17:10, 16; 21:25; 23:8; 46:22; 47:14; 48:18; 49:20 40 [1] - 28:7 401 [1] - 2:22 404-892-5002 [1] - 2:19 404-892-5005 [1] - 2:18 415-439-1400 [1] - 1:16 415-439-1500 [1] - 1:17 443-584-6558 [1] - 2:23 45 [2] - 39:2 49 [1] - 41:21	a.m [5] - 1:6; 3:2; 49:5; 54:16 abbreviated [1] - 7:19 able [5] - 23:23; 27:21; 53:14, 25; 54:1 above-entitled [1] - 55:3 absolutely [2] - 44:24; 46:8 abundance [1] - 21:2 accomplished [1] - 6:5 according [1] - 49:20 Action [2] - 1:4; 3:3 active [8] - 5:6; 8:17, 21; 17:20; 19:4; 29:17; 34:24 actual [5] - 9:9; 15:1; 16:16; 45:13; 51:23 adavis@fr.com [1] - 2:15 add [5] - 19:17; 24:14; 26:20; 32:2, 5 added [1] - 12:17 address [2] - 5:12; 6:2 adjourned [2] - 54:15 admit [1] - 32:21 admits [3] - 33:7, 23, 25 affix [1] - 20:5 affixed [1] - 8:18 affixes [1] - 9:10 ages [1] - 30:20 ago [1] - 28:8 agree [1] - 3:19 agreed [2] - 33:5; 41:21 agreement [1] - 3:21 agrees [2] - 39:18; 43:9 ahead [1] - 54:8 Ahmed [2] - 2:11; 3:11 aided [1] - 2:25 Alexandria [2] - 1:20; 2:22 Alice [5] - 47:21; 48:1, 4 alignment [1] - 24:12 allow [1] - 10:16
	5	
	5 [6] - 16:24; 17:2, 5; 18:23; 35:10 5-A [1] - 12:10 50 [3] - 16:24; 17:3; 25:5 500 [1] - 47:23 501 [1] - 1:20 555 [3] - 1:15; 2:3, 8 57 [1] - 40:12 58.933 [1] - 47:10 59 [2] - 35:14; 49:20	
2	6	
2 [5] - 22:3, 7, 22, 25 20 [8] - 21:20; 29:25; 30:4; 32:24; 33:22; 39:4; 41:5; 45:19 200 [1] - 47:13 20024 [1] - 2:13 202-783-2331 [1] - 2:14 202-783-5070 [1] - 2:14 2023-cv-272 [1] - 3:3 2024 [2] - 1:6; 3:1 209 [1] - 1:19 21 [2] - 30:3; 41:6	6.9 [1] - 47:10 65 [1] - 39:5 66 [1] - 44:14 67 [2] - 40:12; 44:14	

<p>allows [3] - 7:10; 40:13 almost [1] - 30:9 aluminum [1] - 9:1 amount [4] - 25:4, 12; 35:15; 41:21 amounts [1] - 8:24 AMPEREX [1] - 1:3 Amperex [6] - 3:3, 8; 24:25; 25:6, 9, 11 analogy [1] - 47:18 analysis [2] - 17:21; 22:8 analyzed [2] - 14:24; 15:15 Angeles [2] - 2:4, 9 animation [1] - 29:1 annealing [2] - 36:20 annotated [1] - 11:18 annotation [1] - 37:25 anode [13] - 7:1, 6, 8, 11, 22, 24-25; 8:5, 12; 10:9; 26:2; 29:4 answer [1] - 14:10 answered [1] - 52:19 anyway [1] - 54:4 APPEARANCES [2] - 1:13; 2:1 appearances [1] - 3:6 Apple [3] - 25:4, 10, 16 apples [3] - 47:22; 48:5 applied [2] - 30:19 applies [1] - 33:20 apply [5] - 14:3; 32:2; 37:16; 40:21; 43:22 applying [8] - 27:7; 33:18; 36:21; 37:16; 39:17; 42:4; 43:17; 44:7 appreciate [1] - 51:24 approach [3] - 39:14, 25; 40:1 approaches [1] - 39:10 area [2] - 21:7, 9 areas [4] - 4:24; 11:7; 15:12; 22:12 arguing [2] - 44:18, 21 arguments [1] - 51:24 arrive [1] - 18:2 art [10] - 15:3, 17; 18:19; 30:16, 25; 33:25; 41:22; 43:11; 49:23; 50:4 article [1] - 34:13 asserted [2] - 5:4; 22:2 assume [1] - 42:25 ate [4] - 47:24; 48:1, 3, 9 Atlanta [1] - 2:18 atomic [3] - 47:10; 48:2, 8 atoms [1] - 6:22 attached [1] - 28:14 attention [1] - 17:12 available [6] - 12:9, 11, 16; 15:3; 16:20 Avenue [1] - 2:12 awards [1] - 4:16 aware [2] - 27:4; 53:12</p>	<p>bad [1] - 31:20 barrier [3] - 10:15, 17; 14:8 basic [1] - 6:14 batteries [29] - 4:25; 5:3, 10, 21, 25; 6:4, 9, 16-17, 20; 7:18; 8:7; 16:14, 16, 23; 17:7; 24:13, 21-22; 25:4, 23; 26:10, 15; 27:7, 25; 34:22; 43:2 battery [54] - 5:9, 13-14, 16-17; 6:15, 24; 7:1, 9, 11, 15, 20; 8:1, 9, 13; 9:15, 17, 24; 10:10; 16:17, 24-25; 17:3, 24; 18:22, 25; 19:3; 24:13; 25:6, 8, 14, 16; 26:1, 7; 28:17, 21, 23; 29:2, 5, 8; 30:24; 31:23; 32:7; 34:22; 35:5; 40:18; 42:17, 21; 45:4, 13 beam [5] - 19:22; 20:1, 16; 21:7 BEFORE [1] - 1:11 beforehand [2] - 3:20; 18:19 behalf [3] - 3:12, 15; 4:12 behind [1] - 25:11 below [1] - 12:25 better [7] - 5:21; 16:24; 25:16; 35:3; 36:8 between [6] - 7:3, 6, 11; 37:11; 46:21; 50:17 bhbrown@kirkland.com [1] - 1:17 big [1] - 41:4 bigger [1] - 17:6 binder [1] - 9:10 bit [25] - 4:1; 5:24; 6:9; 22:14; 24:14, 16; 25:25; 26:9; 28:17, 25; 29:10; 30:3, 22; 31:21; 32:3, 14, 22; 43:5; 44:10; 46:8, 25; 47:5, 14, 16; 52:2 black [3] - 29:18; 34:20; 45:22 blow [1] - 15:14 blow-up [1] - 15:14 blue [10] - 14:17; 26:6; 30:12; 37:3, 12, 24; 38:2, 17; 39:6; 41:8 Bob [3] - 47:22; 48:1, 3 Bob's [2] - 47:21; 48:4 body [1] - 15:10 bottom [5] - 14:19; 35:7; 45:8, 11, 16 bought [2] - 34:16; 35:11 bounce [1] - 47:4 box [2] - 27:4; 36:10 branding [1] - 25:9 Brandon [2] - 1:14; 3:7 bread [3] - 19:13; 20:6, 11 break [1] - 11:6 briefing [1] - 41:24 briefly [1] - 30:1 brought [2] - 36:3; 50:10 brown [6] - 2:19; 24:2; 49:11, 18; 52:12; 53:5 BROWN [73] - 3:7, 19, 23, 25; 4:6, 11, 23; 9:4, 6, 12; 13:14, 18, 21, 24; 14:3, 10, 13, 17; 18:11, 13, 18; 22:24; 23:6, 9, 13, 17, 21; 24:1, 3, 10, 19; 27:1, 18; 35:23; 36:5, 7, 16; 37:24; 38:3, 5, 7, 11, 13; 42:15, 18, 23; 43:5; 44:14, 24; 46:2, 8, 11; 48:14; 49:3, 10, 12, 20, 25; 50:5,</p>	<p>8, 14, 16, 22; 51:1, 3, 5, 12, 17; 52:3, 18; 53:9; 54:13 Brown [8] - 1:14; 2:16; 3:7, 14; 24:16; 49:9; 50:2; 51:25 brown's [2] - 50:15, 17 BROWN-MARSHALL [39] - 3:23, 25; 4:6, 11, 23; 9:4, 6, 12; 13:14, 18, 21, 24; 14:3, 10, 13, 17; 18:11, 13, 18; 22:24; 23:6, 9, 13, 17, 21; 24:1; 49:10; 50:5, 8, 14, 16, 22; 51:3, 5, 12, 17; 52:3; 53:9; 54:14 Brown-Marshall [6] - 2:16; 3:14; 24:16; 49:9; 50:2; 51:25 brown-marshall@fr.com [1] - 2:19 bulk [2] - 12:12, 15 bunch [2] - 30:6; 36:21 buy [1] - 5:12</p> <p style="text-align: center;">C</p> <p>C-20F [7] - 15:4; 34:17; 35:4, 8, 20; 36:18, 22 CA [5] - 1:16; 2:3, 7, 9 CA-NA [2] - 2:3, 7 calculate [1] - 22:20 California [1] - 1:15 calories [3] - 47:23, 25; 48:8 capacity [2] - 25:15, 17 captured [1] - 17:10 careful [1] - 32:4 cartoon [1] - 32:21 case [23] - 3:18; 4:3; 5:2, 5; 6:7, 11; 8:14; 19:23; 23:1; 24:21, 23; 26:5; 27:18, 23; 29:14, 16; 31:1, 3; 33:3; 43:18; 48:8, 23 cases [3] - 10:7; 27:6; 40:25 category [1] - 5:3 cathode [23] - 6:25; 7:6, 8, 11, 16-17, 21, 23; 8:4, 12-14, 16; 9:6; 16:14, 18, 23; 18:17; 26:2; 29:3, 7 caused [1] - 45:20 causes [3] - 5:25; 29:7; 33:20 cavity [1] - 31:17 cell [7] - 5:13; 17:3, 7, 23; 18:25; 24:22 Cell [1] - 2:23 celsius [1] - 43:1 certain [10] - 6:3; 13:19; 14:4; 19:14; 27:5; 28:15; 33:21 certify [1] - 55:2 chairman [1] - 43:16 chambers [1] - 54:8 change [1] - 48:13 changes [2] - 4:7; 51:25 characteristic [1] - 28:1 characteristics [3] - 27:6, 20; 28:15 charge [11] - 5:15-17; 7:15, 25; 8:8; 9:19; 11:5; 25:18; 28:20; 29:2 charged [7] - 6:22; 7:11, 15, 20; 8:1; 9:15; 17:4</p>
B		
<p>back-and-forth [1] - 7:14 background [2] - 23:3; 53:19</p>		

<p>charging [2] - 9:14; 28:16 chart [1] - 35:8 chemical [3] - 5:8; 10:6; 39:13 Chemical [2] - 34:18 chemistry [2] - 26:24; 47:9 China [1] - 53:13 Christina [2] - 2:16; 3:13 circle [2] - 15:14; 28:5 Circle [1] - 15:24 circled [6] - 30:4, 6, 14; 39:19; 41:8 circles [1] - 39:21 circuit [2] - 7:24; 29:9 circulating [1] - 28:4 cited [3] - 28:10; 34:7, 14 Civil [2] - 1:4; 3:3 Claim [13] - 17:15; 20:18; 21:24; 22:3, 7, 22, 25; 23:13; 37:19; 48:18 claim [6] - 22:2; 23:7; 37:18; 39:9; 46:19; 51:23 Claimant [2] - 1:8; 2:12 claimed [1] - 50:4 claiming [1] - 34:11 Claims [2] - 17:10; 23:7 claims [7] - 17:22; 23:5, 9; 44:15; 48:16, 22; 51:15 clear [7] - 17:16; 18:10; 40:25; 48:7; 49:7, 17; 50:11 clerk [1] - 4:10 CLERK [1] - 3:3 client [3] - 24:25; 53:12 clients [1] - 53:6 close [1] - 21:19 CO [1] - 1:7 coat [8] - 10:13; 11:11, 20-21; 12:7; 32:5; 37:21; 39:11 coated [6] - 5:6; 11:17, 25; 12:20; 32:16; 40:17 coating [53] - 10:14, 21, 25; 11:1; 12:1, 3, 7, 17; 17:13; 18:20; 19:17, 20, 25; 30:20; 31:6, 10; 32:2, 7-8, 12, 17; 33:6, 13, 18, 21; 35:5; 37:2, 7, 14, 17; 39:6, 10, 14, 17, 22; 40:5, 21, 24; 41:22; 42:3-5, 7, 10, 23; 43:3, 10, 12, 18; 44:7 coatings [15] - 25:20; 27:7; 30:19; 37:3, 11, 13, 16; 40:25; 41:14; 42:21, 24; 43:11, 22; 51:13 coats [3] - 32:1; 39:9; 40:23 cobalt [27] - 7:17-19; 8:22; 9:13; 10:8; 13:5; 18:11; 21:6; 22:6, 19, 21; 26:9, 13; 29:18; 30:7; 34:20; 35:12; 38:14; 47:11, 13-14; 48:17, 19 cobaltate [1] - 5:6 collaboratively [1] - 53:5 collected [3] - 15:1, 21; 50:20 collection [1] - 22:17 collector [3] - 8:15, 19 collects [1] - 21:8 color [1] - 24:14 colored [1] - 38:17</p>	<p>column [7] - 33:22; 35:14; 37:19; 39:4; 40:12 coming [5] - 9:20; 14:14; 18:8; 24:11; 45:9 commercially [5] - 12:9, 11; 15:3; 16:20 common [3] - 7:16; 8:20; 11:3 companies [3] - 25:2, 19; 29:21 Company [1] - 4:12 company [3] - 25:1, 15; 43:17 compare [3] - 21:20; 49:8; 50:15 compared [3] - 35:9; 49:15 comparing [2] - 18:22; 49:14 comparison [1] - 36:8 component [3] - 7:7; 26:10; 29:16 components [5] - 6:4, 14; 18:13; 25:13; 26:1 composed [1] - 8:22 computer [1] - 2:25 computer-aided [1] - 2:25 concentrated [1] - 16:2 concentration [14] - 21:14, 19; 22:5, 16, 18, 21; 46:19, 21; 47:7, 20, 24; 48:6, 10, 19 concentrations [1] - 9:2 concept [9] - 14:21, 25; 15:18; 16:4; 17:9, 13; 32:21; 46:5; 47:16 condensed [1] - 30:7 conducts [1] - 4:23 confidential [1] - 52:13 connected [1] - 29:9 connecting [1] - 7:3 constant [1] - 25:18 constructed [1] - 16:17 construction [1] - 51:24 Cont [1] - 2:1 contained [1] - 52:13 containing [1] - 39:8 contestable [1] - 36:17 contested [1] - 41:20 context [6] - 24:20; 25:20; 26:18; 27:21; 44:22; 47:3 continued [1] - 30:11 copies [4] - 4:4, 8; 24:3; 52:6 copy [4] - 4:9, 19, 21; 52:9 core [2] - 28:4; 38:13 corner [2] - 14:19; 36:9 Corporation [2] - 34:18 correct [6] - 38:3; 49:25; 50:4, 7; 51:1; 55:3 correctly [1] - 26:5 correspond [1] - 14:18 counsel [15] - 3:6, 9; 26:5, 19; 28:17; 29:25; 31:5; 32:14, 19; 35:7, 10; 36:12; 37:10, 18; 46:2 count [1] - 47:12 Counter [5] - 1:4, 8, 14; 2:3, 12 couple [5] - 4:6; 13:2; 32:16; 39:13; 44:18</p>	<p>course [1] - 7:9 court [1] - 52:24 Court [7] - 2:20; 52:5, 9; 53:12; 55:6 Court's [1] - 53:3 Courthouse [1] - 2:22 COURTROOM [1] - 3:3 cover [1] - 5:24 crack [56] - 10:25; 11:2, 6, 8, 12, 14, 22, 25; 15:10, 13, 15; 16:3, 5-6, 8; 17:14, 18, 25; 19:1, 8-9, 11; 20:17, 22; 23:14; 30:17; 32:23, 25; 33:1; 35:24; 39:19, 23; 40:11, 14-15, 18; 41:4, 7-8, 10-11; 43:20, 22, 24; 44:4, 8-9, 16, 19; 50:19; 51:6, 10, 14 cracked [2] - 15:20, 24 cracks [32] - 10:23; 11:3; 12:8; 19:19; 30:14, 23-24; 31:1, 5, 10, 12-13, 17, 19-20, 23; 32:10; 37:20; 38:23; 40:2, 10; 41:1, 14, 17, 22; 42:16; 43:3, 6 Craig [2] - 1:18; 3:9 CRAIG [1] - 1:19 craig.reilly@ccreillylaw.com [1] - 1:22 Crandall [1] - 1:18 create [5] - 20:2, 4; 21:14; 26:7; 43:11 created [2] - 12:6; 16:13 creates [5] - 21:9; 26:16; 31:22; 45:17 creating [1] - 26:15 critical [1] - 25:14 cross [8] - 15:6, 8, 23; 20:6, 12-13, 16, 21 cross-section [7] - 15:6, 8, 23; 20:12, 16, 21 cross-sectional [1] - 20:6 CRR [3] - 2:20; 55:2, 6 current [4] - 5:2; 8:15, 19 cut [1] - 20:10 cutting [1] - 15:8 CVD [1] - 39:13 cycle [3] - 7:20; 8:3, 8 cycled [2] - 16:24; 17:4 cycles [2] - 17:3, 6 cycling [1] - 25:18</p>
D		
<p>damn [5] - 28:18, 21; 29:11, 14 darker [1] - 51:9 data [14] - 6:8, 11; 15:1, 21; 18:7; 21:8, 13, 23-24; 22:24; 23:22; 50:20, 22 Date [1] - 55:6 Davis [3] - 2:11; 3:12; 4:11 DAVIS [7] - 3:11; 52:10, 19; 53:2, 23; 54:6, 11 DC [2] - 2:12 dealing [1] - 10:22 dec [2] - 4:4; 52:13 decades [2] - 26:11; 32:1 Declaratory [1] - 3:12</p>		

<p>deconstructed [1] - 19:3 decreased [2] - 9:24; 10:10 deep [2] - 21:20 deeper [2] - 16:6; 21:17 defect [3] - 40:11, 13 Defendant [6] - 1:4, 8, 14; 2:3, 11; 3:13 defined [1] - 48:18 degradation [3] - 6:1; 10:1; 11:9 degrade [1] - 10:7 degrading [2] - 5:17; 11:14 demonstration [1] - 52:2 depositing [1] - 40:7 deposition [6] - 33:12, 24; 37:15; 39:13; 43:16; 52:14 depositions [2] - 33:3 depth [1] - 21:15 describe [1] - 37:9 described [4] - 14:22; 15:23; 31:9; 40:20 describes [2] - 12:6; 32:17 detail [1] - 37:13 details [1] - 24:14 detect [2] - 36:12; 45:8 developed [8] - 4:17; 6:3; 11:17, 19; 14:25; 16:15; 17:1 development [3] - 25:12, 19; 29:23 deviate [1] - 24:16 device [2] - 5:13; 8:6 diagram [1] - 37:23 differ [1] - 32:13 difference [1] - 27:16 different [26] - 13:16; 15:12; 16:1; 20:9, 14, 25; 21:15, 17; 22:4, 14, 16, 19; 23:4; 27:19; 28:14; 30:2; 32:12, 17; 37:2, 11; 40:1; 46:25; 51:10; 52:2 diffused [1] - 16:21 dimensional [5] - 8:23; 9:17, 23; 21:7, 9 directed [1] - 53:11 disagreement [1] - 28:3 disbursed [3] - 16:1; 36:1; 50:7 discharge [6] - 5:16; 7:15; 8:2, 9; 9:19; 11:5 discharged [3] - 7:12; 9:18; 17:4 discharging [2] - 9:14; 28:17 discovered [1] - 28:7 discussed [3] - 3:19; 34:10; 37:13 discusses [3] - 33:25; 34:5; 40:16 discussion [1] - 41:24 dispersive [1] - 21:1 displays [2] - 4:25; 5:1 dispose [1] - 6:18 dispute [3] - 44:17; 46:12; 51:13 disputes [1] - 46:14 disputing [1] - 46:15 dissolving [1] - 10:8 distinction [1] - 50:17 distributed [2] - 35:15; 42:11</p>	<p>distribution [17] - 13:9; 15:17, 25; 17:22, 24; 19:1; 20:23; 21:17; 23:14, 24; 36:14; 41:25; 42:2, 8; 43:10; 44:20 DISTRICT [3] - 1:1, 12 District [1] - 2:21 done [6] - 23:25; 46:14; 53:16, 25; 54:1, 9 dope [1] - 26:20 doped [2] - 8:25; 26:19 dotted [1] - 39:21 Dou [2] - 2:7; 3:8 down [7] - 15:10; 19:25; 28:22; 29:13; 36:19; 45:4, 7 draft [1] - 54:4 draw [1] - 17:12 drawback [1] - 10:21 drawing [2] - 43:15 drawn [1] - 41:3 drew [1] - 33:3 dry [1] - 30:11 dump [1] - 33:9 during [9] - 11:4; 25:6; 30:10, 13; 31:4; 32:25; 39:15; 43:7, 16</p>	<p>Email [7] - 1:17, 22; 2:6, 10, 15, 19, 23 encapsulates [1] - 17:13 encountered [1] - 5:12 end [4] - 42:10; 43:23; 44:8; 45:4 Energy [2] - 3:4; 4:12 energy [5] - 6:21; 21:1; 25:15; 28:23; 29:11 ENERGY [1] - 1:6 engineers [1] - 5:22 enrich [1] - 14:7 enriched [2] - 13:5; 16:8 enrichment [5] - 16:3, 12, 19; 17:1, 10 entitled [1] - 55:3 Esq [6] - 1:14, 18; 2:2, 7, 11, 16 essentially [6] - 28:16; 33:8, 13; 34:20; 41:18; 45:12 etch [2] - 20:1, 4 evaporation [1] - 39:12 everywhere [1] - 24:23 exactly [1] - 29:22 excerpts [1] - 39:3 exist [3] - 31:5, 10; 41:2 existed [1] - 36:25 expanded [1] - 11:24 expect [1] - 23:1 expert [4] - 18:5; 30:15; 41:21; 43:9 experts [2] - 23:23; 46:13 explain [2] - 4:1; 32:21 explained [4] - 4:11; 24:16; 28:17; 32:14 explaining [1] - 43:25 expose [1] - 19:4 exposed [5] - 12:1, 3; 33:10; 41:18; 44:8 exposes [1] - 11:7 exterior [1] - 33:19 extracted [1] - 9:15 extrapolate [1] - 17:6</p>
	<p>E</p>	
	<p>e-mail [2] - 52:20, 22 e-mails [1] - 36:17 easier [3] - 38:9; 47:16; 48:16 EASTERN [1] - 1:1 eating [3] - 47:20 eats [2] - 47:22 EDX [5] - 21:1, 13; 22:11; 23:8 efficient [1] - 53:14 either [8] - 20:2; 25:6; 27:1, 21; 30:10; 39:15; 41:20; 47:13 electrical [1] - 7:24 electricity [1] - 29:8 electrode [13] - 5:6; 6:25; 7:2; 8:17, 21; 16:15; 17:19; 19:4; 26:2; 29:17; 34:24 electrodes [3] - 6:23; 10:5; 26:6 electrolyte [16] - 7:3, 22; 8:4; 10:2-5, 11, 15; 11:8, 14; 12:2; 26:3; 30:10; 31:14 electron [7] - 19:6; 20:14, 16; 22:10; 44:25; 46:3 electronic [1] - 4:25 electronics [1] - 4:15 electrons [14] - 7:23; 8:5; 45:5, 7-11, 13, 15, 21-22; 47:1, 4 element [6] - 17:15, 17; 27:9; 28:2; 44:16; 47:10 elements [25] - 8:24; 17:24; 19:1; 20:23; 21:3, 11, 15, 18; 22:16, 19; 27:3, 12; 29:22; 30:8; 32:16; 34:3, 21; 40:15, 23; 46:19; 47:4, 8 ELLIS [3] - 1:14; 2:3, 7 elsewhere [1] - 42:1</p>	<p>F</p>
		<p>face [2] - 34:7, 14 fact [2] - 6:20; 35:20 fairly [1] - 11:3 familiar [1] - 6:11 Fax [6] - 1:17, 21; 2:5, 10, 14, 19 feature [2] - 19:15; 22:4 features [1] - 20:17 few [4] - 18:4; 24:3; 33:24; 34:21 FIB [1] - 19:23 field [1] - 4:15 figure [20] - 15:16; 20:23; 29:21; 32:19; 35:4, 16; 36:6, 8-9; 37:3; 38:8, 11; 39:19; 41:4; 44:2; 47:20; 50:17, 22; 51:2 Figure [7] - 11:19, 24; 12:10; 14:19; 19:5, 10; 32:18 figured [1] - 12:19 figures [5] - 35:22; 37:8; 42:6; 49:8, 14</p>

<p>file [3] - 52:16, 20, 25 fill [1] - 38:24 filled [1] - 41:17 filling [2] - 40:14; 43:6 fills [1] - 41:2 finally [1] - 6:6 finished [1] - 24:1 first [8] - 5:14; 12:16; 19:2, 16; 28:10; 33:18; 48:19; 54:7 Fish [1] - 3:12 FISH [2] - 2:12, 16 five [1] - 16:20 flashlight [1] - 6:18 flesh [1] - 52:12 floating [3] - 30:9; 31:16 Floor [2] - 1:15; 2:17 flow [1] - 29:13 Flower [2] - 2:3, 8 flows [1] - 31:18 fluid [1] - 7:4 fluorine [47] - 11:20; 12:12, 22; 13:1, 3-5, 7, 10, 17, 22; 14:6, 14; 16:13, 19, 22; 17:1, 9, 16, 18, 23; 18:14; 20:24; 21:5, 21; 23:14, 17, 22, 24; 31:13, 16-17, 19, 21; 32:9; 34:21; 35:13, 16, 18-19; 36:11, 19, 23; 44:16; 50:7 focus [2] - 44:20 focused [7] - 5:8; 8:11; 19:22; 20:15; 23:11; 31:1; 37:10 focusing [1] - 8:14 focussed [1] - 23:19 follow [1] - 49:6 follow-up [1] - 49:6 food [1] - 47:24 FOR [1] - 1:1 foregoing [1] - 55:3 forever [1] - 30:25 form [7] - 10:15; 20:19; 39:25; 41:17; 42:16, 22 formed [2] - 10:25; 39:7 former [1] - 43:16 forming [4] - 14:21; 16:12; 30:24; 43:4 forms [2] - 14:8; 30:8 forth [7] - 6:23; 7:5, 10, 14; 10:5; 21:8; 28:24 forward [5] - 25:24; 27:24; 30:22; 44:10, 14 founded [2] - 4:15; 26:14 four [1] - 26:1 fourth [3] - 40:3, 10, 20 fraction [1] - 25:22 fragile [1] - 19:19 Francisco [1] - 1:16 frequently [1] - 5:18 front [2] - 28:9; 44:18 fun [1] - 24:10 function [2] - 21:15; 25:14</p>	<p style="text-align: center;">G</p> <p>GA [2] - 2:16, 18 GA-NA [1] - 2:16 gallium [1] - 19:24 gel [4] - 33:7, 24; 37:15; 39:11 general [1] - 47:15 generally [1] - 24:12 generates [2] - 29:13 generation [2] - 27:23; 29:7 gentleman [1] - 28:8 giant [1] - 45:1 GILES [1] - 1:11 given [1] - 52:7 glad [1] - 3:21 gold [1] - 14:18 grams [2] - 47:13, 15 graph [1] - 21:14 graphics [1] - 25:25 graphs [1] - 21:22 grayscale [2] - 15:5; 50:19 great [4] - 5:14; 37:13; 49:3; 53:20 green [5] - 10:24; 27:11; 37:4, 11; 38:19 group [1] - 5:22 guess [2] - 23:1; 51:11</p> <p style="text-align: center;">H</p> <p>half [1] - 15:8 hamburger [3] - 47:22; 48:4 hand [4] - 14:19; 15:2; 21:10; 24:4 happy [1] - 23:3 hard [3] - 4:4; 5:20; 39:20 hardened [1] - 31:22 hardens [2] - 33:10, 14 harder [1] - 36:12 hear [1] - 7:17 heard [5] - 24:15; 25:3; 28:3; 35:7; 40:22 HEARING [1] - 1:11 hearing [2] - 4:8; 53:4 hears [1] - 34:13 heart [1] - 53:4 heat [5] - 12:19; 14:4; 18:21; 33:20; 36:21 heated [2] - 35:13; 36:2 heating [6] - 34:3; 36:22; 42:9, 20-21; 49:24 held [1] - 9:9 help [1] - 5:9 helped [2] - 46:8; 47:19 helpful [1] - 53:19 helps [3] - 43:3, 5; 44:25 high [3] - 25:15; 47:9 High [1] - 26:24 higher [1] - 13:6 highlighted [4] - 27:10; 30:12; 36:19;</p>	<p>39:21 history [1] - 4:14 hmm [1] - 13:18 hold [5] - 4:18; 5:14, 17; 19:20; 27:22 holder [1] - 20:5 Honor [24] - 3:7, 11, 19, 23; 17:12; 23:6; 24:3, 11; 42:6; 44:12; 46:12; 48:11, 24; 49:3; 50:14; 51:3, 12; 52:3, 10, 18-19; 53:2, 23; 54:11 HONORABLE [1] - 1:11 hope [1] - 46:8 hopeful [1] - 54:1 hot [2] - 43:2 hundred [1] - 13:4 hundreds [1] - 17:4</p>
		<p style="text-align: center;">I</p> <p>idea [9] - 10:18; 11:11; 27:25; 28:13; 33:7; 34:2; 41:25; 42:11; 48:5 identified [3] - 10:22; 19:11; 20:21 ignore [1] - 8:12 illustration [2] - 6:14; 10:23 illustrative [1] - 18:6 image [17] - 9:9; 15:2, 5; 17:19; 19:5; 20:9, 16, 19; 23:19; 29:25; 32:24; 36:2; 43:14; 44:17; 45:16 imagery [5] - 45:17, 19, 23; 46:13, 16 images [5] - 18:5; 19:7; 35:25; 50:12, 19 imagine [3] - 17:5; 19:18; 25:13 imagined [1] - 24:19 imbed [1] - 40:11 impact [1] - 42:20 important [2] - 26:17; 50:16 improve [1] - 5:10 improved [2] - 6:4; 16:11 improvement [2] - 17:2; 25:23 impurities [1] - 44:2 in-between [2] - 7:3; 37:11 included [1] - 18:5 including [2] - 5:6; 30:25 increase [1] - 17:5 indicates [1] - 45:20 indiscernible [1] - 24:7 industry [1] - 32:1 Industry [2] - 34:18 influential [1] - 25:2 information [1] - 18:3 injected [1] - 26:20 inner [1] - 28:5 innovation [3] - 4:14; 5:9; 6:2 innovative [1] - 4:16 inside [13] - 31:19, 25; 33:17, 20-21; 40:1, 17, 23-24; 42:4; 43:23; 44:4; 45:5 instance [1] - 27:8 instead [1] - 16:1 intend [1] - 51:20 intended [2] - 38:24; 40:9</p>

<p>interact [2] - 11:8; 32:10 interacting [2] - 11:14; 25:6 interaction [1] - 10:11 interactions [1] - 10:2 interchangeably [1] - 20:20 interested [1] - 22:20 interesting [2] - 41:16, 23 interior [7] - 12:12, 14, 22; 13:8, 25; 14:2, 7 internal [1] - 36:17 interspersed [1] - 13:24 invent [1] - 34:1 invented [2] - 34:2; 39:10 invention [5] - 10:12, 19; 34:12; 35:10; 37:9 inventor [2] - 16:10; 49:22 inventors [11] - 5:11, 19, 22; 6:1; 10:22; 11:11; 12:5, 19; 14:24; 15:12; 23:22 involve [1] - 7:17 involved [3] - 6:9; 7:7; 17:21 involves [1] - 5:2 inward [1] - 14:15 inwards [1] - 12:25 ion [19] - 5:8, 10, 25; 6:4, 15-16; 10:2; 19:22; 24:13, 21-22; 25:13; 26:1, 10, 15; 27:6, 25; 28:12 ions [23] - 6:21, 23; 7:5, 10, 16, 21, 25; 8:4; 9:15, 18-19; 10:4, 17; 19:23; 27:22, 25; 28:3, 23; 29:2, 11; 32:6; 38:15 iPhone [1] - 30:15 iPhones [1] - 25:4 issue [6] - 4:2; 46:17; 48:10; 53:2, 12 items [1] - 48:2 itself [7] - 8:3; 16:8, 11; 32:10, 13; 33:25; 51:14</p>	<p>KIRKLAND [3] - 1:14; 2:3, 7 known [5] - 10:12; 33:6, 15, 23; 34:4</p> <p style="text-align: center;">L</p> <p>labeled [1] - 15:16 LABORATORY [1] - 1:7 Laboratory [2] - 3:4; 4:12 language [1] - 37:18 laptop [1] - 25:7 large [2] - 25:4; 46:24 largely [1] - 24:22 last [3] - 35:21, 25; 53:4 lattice [3] - 8:23; 26:8, 16 LAW [1] - 1:19 layer [14] - 8:15; 9:8; 10:24; 13:3; 14:7, 17-18, 22; 17:10; 19:4, 7; 38:23; 40:4; 42:5 layers [2] - 13:16; 14:18 LCO [1] - 7:19 leached [1] - 31:21 lead [1] - 9:24 leaking [1] - 32:9 learned [1] - 28:11 least [5] - 32:17; 41:24; 42:24; 51:21 left [12] - 10:24; 14:19; 15:2, 6; 18:20, 23; 20:3, 9; 21:10; 26:6; 36:9; 53:10 left-hand [3] - 14:19; 15:2; 21:10 letting [1] - 28:22 level [5] - 13:1, 5; 15:19; 16:7; 30:1 levels [9] - 12:11, 13-14, 22; 13:6, 16, 22; 14:1; 16:21 LiCoO₂ [3] - 18:10; 26:12, 14 life [1] - 41:7 lift [1] - 20:5 light [1] - 45:6 limitation [1] - 17:13 Limited [2] - 3:4 LIMITED [1] - 1:3 Lindsey [2] - 2:2; 3:8 lindsey.shi@kirkland.com [1] - 2:6 line [9] - 16:2; 36:4, 18; 39:4, 21; 42:8; 50:11; 51:9 liquid [8] - 31:18; 33:9; 39:11, 16; 41:11 literal [1] - 29:18 lithium [61] - 5:6-8, 10, 25; 6:4, 15-16, 21-23; 7:5, 10, 16-19, 21, 24; 8:4, 21, 23; 9:13, 15, 18; 10:2, 4, 16; 18:11; 24:13, 21-22; 25:13; 26:1, 9-10, 12, 15; 27:6, 21, 23-25; 28:1, 4, 6, 11, 14; 29:18; 30:7; 31:21, 24; 32:9; 34:20; 35:12; 37:8; 38:14; 47:10 lithium-ion [16] - 5:8, 10, 25; 6:4, 15-16; 10:2; 24:13, 21-22; 25:13; 26:1, 10, 15; 27:6, 25 live [2] - 4:7; 52:2 LLP [3] - 1:14; 2:3, 7 loaf [1] - 19:13</p>	<p>local [1] - 3:9 located [2] - 9:3, 5 lock [1] - 32:5 locked [1] - 45:2 look [19] - 5:20; 19:8, 15; 20:3, 7, 17, 22; 21:4, 7, 14, 17, 19; 25:8; 27:13; 28:9; 30:1; 41:7; 48:16 looked [3] - 16:10; 20:21; 36:2 looking [24] - 17:22, 24; 19:1; 20:11; 21:23; 22:12; 23:5, 8, 13, 22; 31:1; 42:7; 45:18; 48:6, 13, 20; 50:3, 18, 23; 51:4, 6, 9, 14 looks [11] - 9:7; 16:1; 22:5, 13, 15; 28:25; 29:24; 32:22; 35:16; 45:13, 24 Los [2] - 2:4, 9 lose [1] - 47:3 lost [1] - 37:25 low [8] - 12:11, 13-14, 22; 13:22; 14:1; 15:19; 16:21 lower [5] - 11:1; 16:7; 36:6, 8 LTD [1] - 1:7</p> <p style="text-align: center;">M</p> <p>machine [2] - 2:24; 45:1 machinery [1] - 46:25 Madison [1] - 1:19 Magistrate [1] - 53:6 magnesium [57] - 5:7; 9:1; 11:20; 12:12, 21; 13:1, 3-6, 9, 17, 21; 14:5, 14; 15:16, 19, 25; 16:2-4, 7, 12, 19, 21; 17:1, 9, 17-18, 23; 18:14; 20:24; 21:5, 18, 21; 23:12, 14-15, 17, 20, 22; 29:20; 34:21; 35:12, 15, 18-19; 36:10, 13; 44:3; 50:7, 11 mail [2] - 52:20, 22 mails [1] - 36:17 main [2] - 7:7; 18:13 Maine [1] - 2:12 major [1] - 26:1 Man [4] - 32:22; 33:2; 43:14; 44:2 manometers [2] - 21:20 manufactur [1] - 31:8 manufacture [4] - 30:10, 13; 31:11; 39:15 manufacturing [7] - 11:4; 31:4-6, 9; 33:1; 41:3 map [2] - 15:16; 21:9 maps [1] - 21:11 market [2] - 34:16; 35:11 Markman [2] - 41:24; 53:25 MARSHALL [39] - 3:23, 25; 4:6, 11, 23; 9:4, 6, 12; 13:14, 18, 21, 24; 14:3, 10, 13, 17; 18:11, 13, 18; 22:24; 23:6, 9, 13, 17, 21; 24:1; 49:10; 50:5, 8, 14, 16, 22; 51:3, 5, 12, 17; 52:3; 53:9; 54:14 Marshall [6] - 2:16; 3:14; 24:16; 49:9; 50:2; 51:25</p>
J		
<p>Jamal [1] - 2:11 Japan [2] - 34:19; 53:13 job [1] - 10:22 joke [1] - 25:1 JUDGE [3] - 1:12; 4:20; 24:7 judge [1] - 4:19 Judge [4] - 24:5; 53:7, 17; 54:8 Judgment [1] - 3:12 jump [3] - 41:20; 44:10, 14</p>		
K		
<p>keep [1] - 13:19 keeps [1] - 7:8 kind [24] - 8:12; 9:7, 21; 12:14; 13:24; 14:18; 19:20; 20:20; 21:23; 31:22, 24; 32:5, 7; 33:5, 10; 36:1; 38:13; 41:10; 44:25; 45:12; 46:16 kinds [1] - 40:19</p>		

<p>marshall@fr.com [1] - 2:19 material [21] - 5:6; 7:10; 8:12, 16-18, 20-21; 16:14, 18; 17:20; 19:4; 26:7, 19; 29:17; 34:25; 39:7; 41:21; 43:10, 19 materials [6] - 7:16; 10:21; 16:23; 40:17; 41:22 matter [1] - 55:3 mean [2] - 30:5; 41:3 meaning [1] - 28:2 means [4] - 26:12, 20; 42:3; 44:19 measure [4] - 21:2; 22:18; 23:23; 48:7 measured [2] - 22:7; 50:13 measurement [5] - 36:11; 47:15; 48:3 measures [2] - 22:16; 47:2 measuring [6] - 22:20; 47:7, 25; 48:2, 7, 9 medium [1] - 7:4 meet [1] - 46:18 mention [1] - 26:8 mentioned [6] - 8:7, 20; 9:12; 26:19; 29:10; 37:2 mentions [1] - 33:23 metal [4] - 28:7; 39:8; 48:18, 20 metals [11] - 26:20, 23; 27:5, 13, 15, 20; 40:8; 48:13, 22 method [5] - 12:6; 39:11 methods [3] - 33:6, 24; 37:14 MGK [1] - 36:10 microscope [5] - 19:6; 20:15; 44:25; 46:3 middle [3] - 19:14; 27:5; 28:5 might [4] - 6:18; 24:19; 25:13; 32:18 migrate [3] - 12:23, 25; 14:6 migrated [1] - 16:4 mind [2] - 41:6; 49:14 minimize [1] - 43:3 minute [2] - 4:19; 25:21 minutes [1] - 49:2 missed [1] - 53:21 mixed [2] - 26:21; 29:20 molecules [1] - 22:15 MORNING [1] - 3:1 morning [10] - 3:7, 10-11, 15-16, 23-24; 4:8; 51:19; 52:10 most [4] - 8:20; 25:2; 27:9; 44:6 mostly [2] - 8:23; 24:23 MOTION [1] - 1:11 mouth [1] - 33:1 move [12] - 7:5, 10, 21, 23; 8:4; 9:18; 10:4, 17; 12:23; 14:6; 23:18 moved [2] - 7:25; 16:8 movement [5] - 6:21; 9:20; 23:11; 35:18 moves [3] - 10:9; 13:20; 23:15 moving [6] - 14:12, 14; 28:24; 29:2, 11; 53:24 MR [41] - 3:7, 11, 19; 24:3, 10, 19; 27:1, 18; 35:23; 36:5, 7, 16; 37:24; 38:3, 5, 7, 11, 13; 42:15, 18, 23; 43:5;</p>	<p>44:14, 24; 46:2, 8, 11; 48:14; 49:3, 12, 20, 25; 51:1; 52:10, 18-19; 53:2, 23; 54:6, 11, 13 MS [39] - 3:23, 25; 4:6, 11, 23; 9:4, 6, 12; 13:14, 18, 21, 24; 14:3, 10, 13, 17; 18:11, 13, 18; 22:24; 23:6, 9, 13, 17, 21; 24:1; 49:10; 50:5, 8, 14, 16, 22; 51:3, 5, 12, 17; 52:3; 53:9; 54:14 multiple [2] - 23:8; 34:8</p> <p style="text-align: center;">N</p> <p>NA [3] - 2:3, 7, 16 name [1] - 6:20 named [1] - 28:8 nanoscale [2] - 30:1; 45:23 narrow [1] - 45:4 NE [1] - 2:17 need [5] - 10:4; 13:12; 29:12; 32:8 needs [1] - 53:11 negative [3] - 7:2; 26:3; 45:16 never [2] - 24:10; 25:2 new [6] - 11:7; 30:24; 41:16; 42:21, 23; 43:4 news [1] - 51:18 next [22] - 4:13; 6:13; 7:13; 8:10; 9:25; 10:20; 11:23; 12:4; 14:23; 16:9; 18:4; 20:8; 22:1, 9; 30:18; 42:2, 13; 43:8, 15; 46:24; 47:8, 17 nine [1] - 27:3 Nippon [1] - 34:18 Nobel [1] - 28:11 nobody [2] - 37:6; 46:15 non [1] - 13:11 none [1] - 42:19 nonuniform [7] - 13:9; 41:24; 42:2, 8; 43:10; 44:19 nonuniformly [1] - 42:10 normal [1] - 17:3 note [6] - 3:6; 4:6; 18:4; 20:18; 41:23; 52:11 noted [1] - 35:14 nothing [10] - 37:20; 38:17, 25; 41:15; 42:11; 43:5, 21; 54:13 notice [1] - 5:17 nowhere [1] - 39:24 number [7] - 15:14; 32:12; 33:6; 37:2; 48:2; 52:11; 53:24</p> <p style="text-align: center;">O</p> <p>O2 [1] - 26:13 obligated [1] - 43:13 observed [2] - 17:19; 44:16 obviously [1] - 44:17 occasionally [1] - 30:14 occurred [1] - 49:4 OF [3] - 1:1, 11, 19</p>	<p>off-the-shelf [1] - 36:13 OFFICE [1] - 1:19 Office [1] - 34:6 Official [2] - 2:21; 55:6 official [1] - 52:23 old [1] - 26:14 OLED [1] - 5:1 once [4] - 6:18; 29:6; 31:19; 32:8 one [44] - 4:18, 24; 5:4, 8; 6:15; 10:18, 21; 12:6; 15:2, 7, 22; 16:17; 17:7, 12; 18:19; 20:18; 22:5, 12-13; 23:19; 25:2; 26:12; 27:14; 28:5; 29:3; 30:4, 6, 12; 32:24; 43:13; 46:11, 20; 47:17; 48:1, 3-4; 49:6, 8; 52:10; 53:2 one's [1] - 23:11 ones [7] - 6:16; 24:22; 31:2; 48:23 open [2] - 25:8; 31:17 operation [1] - 43:7 opportunity [1] - 4:1 optimize [1] - 32:7 options [1] - 39:9 orange [1] - 45:7 order [4] - 3:17; 31:6; 32:2; 46:18 original [1] - 35:8 outcome [1] - 43:12 outer [16] - 10:13, 25; 11:13, 21; 12:2, 7, 17, 25; 13:7; 14:7; 23:12; 50:23; 51:5, 11, 13 outlines [1] - 19:12 outside [23] - 28:5; 30:20; 33:10, 14, 17-19; 37:16, 21; 38:25; 39:14, 25; 40:6, 21; 41:2; 42:9; 43:20, 23; 44:5 outward [4] - 12:23; 13:20; 14:14 outwards [1] - 14:6 overall [1] - 51:11 overview [1] - 6:10 own [2] - 41:21; 46:12 oxide [14] - 5:7; 7:17-19; 8:22; 9:13; 13:6; 18:11; 26:9; 29:19; 30:7; 34:20; 35:12; 38:14 oxygen [2] - 8:24; 26:13</p> <p style="text-align: center;">P</p> <p>Pac [4] - 32:22; 33:2; 43:14; 44:2 Pac-Man [4] - 32:22; 33:2; 43:14; 44:2 page [1] - 18:9 parameters [2] - 14:4; 18:21 part [8] - 5:8; 11:1, 5; 17:21; 38:19; 43:13; 52:6, 22 particle [72] - 10:8, 16; 11:1, 12-13, 16, 18-19, 21; 12:2, 9, 11, 13, 15-16, 18, 23; 13:8, 25; 14:7; 15:4, 6, 9-10, 17, 23, 25; 16:11, 20, 22, 25; 17:20, 25; 18:14-16, 20, 23-24; 19:10, 12, 15; 20:10; 21:16; 22:6, 12; 30:5, 9, 14, 17; 31:18; 32:10, 16, 21, 23, 25; 33:11, 21; 38:14; 41:8, 10, 18; 45:13; 47:11; 50:24; 51:6, 14</p>
---	--	--

<p>particles [47] - 8:18, 21-22, 25; 9:8, 13, 16, 18, 20; 10:3, 6, 13, 23; 11:3, 6, 10; 12:20; 14:24; 15:1, 3, 7, 22; 19:2, 5, 7-8; 22:5, 15, 17; 30:2, 6, 13, 24; 31:15, 25; 32:1; 33:8, 13; 37:17, 21; 39:7, 15; 40:7; 47:12</p> <p>particular [3] - 26:7; 27:13; 29:16</p> <p>particularly [1] - 28:6</p> <p>parties [2] - 10:2; 44:17</p> <p>partner [1] - 3:13</p> <p>parts [3] - 27:10, 13; 53:24</p> <p>patent [45] - 4:2; 5:2, 4, 7; 8:16; 11:19; 13:8; 14:22; 23:21; 24:17; 27:12; 28:9; 30:16; 31:8; 32:13; 33:7, 16, 22; 34:1, 11, 14-15; 35:12, 14; 37:1, 13, 19; 38:16, 20; 39:3, 18, 20, 24; 40:16, 21, 25; 41:13; 42:24; 43:6; 50:4, 23</p> <p>Patent [8] - 5:5; 8:11; 12:6; 17:11; 22:2; 32:15; 34:6, 8</p> <p>patentee [3] - 33:7; 34:11; 36:24</p> <p>patents [1] - 4:16</p> <p>PATRICIA [1] - 1:11</p> <p>pause [1] - 48:11</p> <p>pave [1] - 40:9</p> <p>PC [2] - 2:12, 16</p> <p>PDF [1] - 4:9</p> <p>Peachtree [1] - 2:17</p> <p>people [2] - 27:2; 44:6</p> <p>percent [5] - 13:4; 16:24; 17:2, 5; 25:5</p> <p>performance [11] - 5:10, 16, 21; 6:5; 9:24; 10:1, 10; 11:15; 16:11, 25; 35:9</p> <p>periodic [5] - 27:2, 10, 14; 28:2</p> <p>phase [2] - 39:11</p> <p>phenomenal [1] - 25:12</p> <p>phone [9] - 5:13; 17:3, 8, 23; 18:25; 25:7, 17; 31:2; 43:2</p> <p>phones [2] - 24:22, 24</p> <p>photo [1] - 22:10</p> <p>ph} [1] - 28:8</p> <p>piece [1] - 46:25</p> <p>pieces [1] - 19:20</p> <p>place [2] - 19:21; 53:6</p> <p>Plaintiff [3] - 1:4, 14; 2:2</p> <p>play [2] - 10:18; 29:3</p> <p>plus [2] - 35:12</p> <p>point [10] - 6:15; 13:2; 21:3; 22:13; 26:11; 42:5; 43:13, 17, 21</p> <p>pointed [1] - 42:6</p> <p>pointing [1] - 35:19</p> <p>portion [10] - 13:7, 13; 15:15; 17:19; 40:11, 18; 44:16, 19; 53:20</p> <p>portions [1] - 51:10</p> <p>positive [12] - 5:5; 6:25; 8:16, 21; 16:14; 17:19; 19:4; 26:2, 6; 29:17; 34:24</p> <p>positively [1] - 6:21</p> <p>powder [4] - 29:18; 30:2; 34:20</p> <p>power [5] - 27:23; 28:7; 29:7, 12, 15</p> <p>powers [1] - 8:6</p>	<p>practice [1] - 37:6</p> <p>precursor [1] - 34:22</p> <p>present [9] - 9:2; 12:14; 13:7; 17:18; 37:20; 40:11; 44:16, 18</p> <p>presentation [2] - 35:25; 49:9</p> <p>presenting [1] - 3:14</p> <p>preserve [1] - 11:15</p> <p>preserving [1] - 52:8</p> <p>president [1] - 43:16</p> <p>prevent [2] - 10:15; 11:13</p> <p>previous [1] - 12:2</p> <p>prime [2] - 44:4</p> <p>printed [1] - 4:7</p> <p>Prize [1] - 28:11</p> <p>problem [11] - 5:11, 19, 23; 6:1; 11:9; 40:15; 52:16; 53:17; 54:5, 10</p> <p>procedural [1] - 53:3</p> <p>PROCEEDINGS [1] - 1:11</p> <p>proceedings [2] - 49:4; 55:3</p> <p>Proceedings [2] - 2:24; 54:16</p> <p>process [9] - 7:15; 8:3; 9:19; 11:5; 15:22; 16:18; 29:2; 31:4</p> <p>produced [1] - 2:24</p> <p>product [4] - 34:16; 35:15; 36:14; 37:7</p> <p>progresses [1] - 6:12</p> <p>progression [1] - 23:10</p> <p>protect [1] - 27:22</p> <p>protective [12] - 10:14; 12:1; 13:3; 14:8, 21; 17:10; 19:17, 20, 24; 32:3; 35:20</p> <p>protects [1] - 32:8</p> <p>provide [1] - 4:21</p> <p>pull [1] - 38:7</p> <p>pulled [2] - 9:16; 28:13</p> <p>pulling [1] - 9:22</p> <p>pumping [2] - 28:18, 20</p> <p>purpose [2] - 51:22</p> <p>purposes [1] - 27:18</p> <p>pushing [1] - 9:22</p> <p>put [9] - 16:15; 19:19; 25:20; 37:8, 18; 41:9, 11; 45:5; 51:13</p> <p>Putanon [1] - 28:8</p>	<p>RDR [3] - 2:20; 55:2, 6</p> <p>RDR-CRR [1] - 55:2</p> <p>reach [1] - 54:8</p> <p>reached [1] - 53:17</p> <p>reacting [1] - 10:16</p> <p>reaction [1] - 10:6</p> <p>ready [2] - 29:5; 30:11</p> <p>real [2] - 32:24; 41:7</p> <p>realized [1] - 53:10</p> <p>really [14] - 5:20; 25:10, 22; 27:19; 28:11, 23; 31:8; 36:24; 42:2; 43:21; 46:15; 49:15; 51:21, 24</p> <p>reason [1] - 31:13</p> <p>reasons [1] - 53:24</p> <p>recess [2] - 48:25; 49:4</p> <p>recharge [2] - 5:18; 6:17</p> <p>rechargeability [1] - 31:23</p> <p>rechargeable [6] - 4:25; 5:3, 9, 13; 6:16; 8:7</p> <p>record [6] - 3:6; 39:3; 52:8, 23-24; 55:3</p> <p>rectangle [4] - 19:11; 21:10, 12; 22:13</p> <p>red [7] - 15:13; 19:11; 30:15; 37:4, 12; 38:23; 41:9</p> <p>redo [1] - 24:15</p> <p>reduces [1] - 31:23</p> <p>refer [3] - 7:18; 13:10; 44:3</p> <p>reference [2] - 28:10; 34:5</p> <p>referenced [1] - 50:23</p> <p>references [2] - 34:6, 8</p> <p>refers [4] - 8:16; 13:8; 27:9; 36:21</p> <p>reflected [1] - 50:13</p> <p>reflecting [2] - 49:19</p> <p>region [13] - 37:10, 14, 19, 22; 38:16, 19; 39:4, 6, 24; 40:3, 10</p> <p>regions [1] - 40:20</p> <p>REILLY [1] - 1:19</p> <p>Reilly [2] - 1:18; 3:9</p> <p>related [1] - 21:24</p> <p>relation [1] - 22:25</p> <p>relative [7] - 21:2, 14, 17; 22:5, 16, 21; 46:20</p> <p>release [2] - 27:22; 38:15</p> <p>released [1] - 28:15</p> <p>releasing [2] - 28:12, 19</p> <p>remember [3] - 26:24; 35:8; 47:9</p> <p>remotely [3] - 53:15; 54:9</p> <p>repaired [1] - 40:14</p> <p>repeated [1] - 42:16</p> <p>report [2] - 18:5; 30:15</p> <p>reported [1] - 2:24</p> <p>REPORTER [1] - 24:8</p> <p>Reporter [3] - 2:20; 55:6</p> <p>representative [7] - 17:15, 17; 26:23; 27:9, 12, 17; 33:5</p> <p>represented [5] - 12:9; 35:10, 17; 44:15; 52:24</p> <p>representing [1] - 25:1</p> <p>request [1] - 53:11</p> <p>require [1] - 44:15</p>
Q		
<p>questions [7] - 23:2; 24:6, 15, 25; 44:11; 48:11; 49:2</p> <p>quick [1] - 48:25</p> <p>quoting [1] - 39:4</p>		
R		
<p>raise [1] - 53:3</p> <p>randomly [4] - 12:14; 13:24; 15:20; 16:1</p> <p>rather [2] - 48:3; 52:20</p> <p>ratio [2] - 48:12, 17</p> <p>ray [3] - 21:1; 22:10; 45:12</p>		

<p>required [2] - 22:22; 43:1 requires [5] - 17:15; 20:18; 22:7; 44:19; 46:18 research [5] - 4:17, 23; 25:12, 18; 29:23 respond [1] - 50:2 response [1] - 11:17 result [1] - 16:12 results [1] - 35:3 reuse [1] - 5:15 reverses [1] - 8:3 RICHARDSON [2] - 2:12, 16 Richardson [1] - 3:12 RMR [1] - 2:20 rock [1] - 41:10 rocks [1] - 30:9 room [1] - 25:6 run [1] - 35:2 running [2] - 28:22; 46:13</p>	<p>45:1, 6; 47:12; 50:19; 51:2, 9 seeing [2] - 18:7; 29:1 segregated [1] - 16:5 segregation [24] - 13:10; 33:15, 20; 34:1, 9; 35:17; 36:19, 23; 37:20; 38:18, 20; 39:1, 25; 40:22; 41:1; 42:4, 12, 24; 43:12, 18; 44:1, 19 segregation-specific [1] - 43:12 SEL [15] - 3:13, 17; 4:12, 14, 23; 5:4, 9, 11, 19, 23; 6:1; 33:25; 34:6, 15; 37:8 SEL's [5] - 4:2; 18:5; 36:17; 41:21; 43:16 selection [1] - 29:23 SEM [2] - 20:10; 29:25 Semiconductor [2] - 3:4; 4:12 SEMICONDUCTOR [1] - 1:6 semiconductor [1] - 4:24 send [1] - 4:8 sense [3] - 3:17; 41:13; 51:22 separates [1] - 7:8 separator [3] - 7:7, 9; 26:4 September [1] - 1:6 SEPTEMBER [1] - 3:1 series [1] - 40:7 SESSION [1] - 3:1 set [6] - 4:10; 21:23; 22:15; 25:24; 35:6 setting [1] - 24:20 several [1] - 26:11 share [1] - 29:8 sheet [3] - 9:7, 10 shelf [1] - 36:13 shell [5] - 31:22; 32:3, 5; 34:3; 42:10 Shi [2] - 2:2; 3:8 shooting [2] - 45:7, 10 shoots [2] - 45:5; 47:1 short [1] - 21:1 shorthand [1] - 2:24 shorting [1] - 7:9 show [9] - 18:2, 6; 21:22; 26:9; 30:21; 36:17; 38:5, 24; 50:19 showed [6] - 32:19; 33:8; 35:8, 17; 36:1; 37:4 showering [1] - 33:13 showing [4] - 32:23; 35:4; 45:15; 49:21 shown [2] - 19:5; 37:3 shows [6] - 30:1; 33:4; 35:4; 36:19; 38:23; 50:3 shuttled [1] - 7:6 side [13] - 7:1; 8:12; 15:2; 16:9; 20:2; 21:10; 28:15; 29:3, 7; 50:6 sides [1] - 20:4 sideways [1] - 20:11 similar [2] - 28:25; 37:18 sitting [2] - 30:11; 53:18 skip [3] - 25:24; 27:24; 30:22 slice [11] - 19:12, 14, 17, 25; 20:2, 6, 10; 22:13; 45:3 slices [1] - 19:18</p>	<p>slide [43] - 4:4, 13; 6:13; 7:13; 8:10; 9:25; 10:20; 11:23; 12:4; 14:20, 23; 18:18; 20:8; 22:1, 9; 29:25; 30:3; 32:24; 33:22; 35:22; 38:8; 39:3; 41:5, 20; 42:2, 13; 43:8, 15; 45:19; 46:18, 24; 47:8, 17; 48:15; 49:15, 18; 50:3, 18 Slide [1] - 27:11 slides [6] - 18:4; 24:3; 27:1; 38:17; 52:11, 17 slightly [1] - 22:4 slowly [1] - 29:6 small [3] - 8:24; 9:2, 20 smarter [1] - 27:2 smartphones [1] - 25:5 smiled [1] - 53:9 sol [4] - 33:7, 24; 37:15; 39:11 sol-gel [4] - 33:7, 24; 37:15; 39:11 solid [2] - 36:4; 39:11 solution [4] - 7:4; 12:20; 14:4; 31:16 sometimes [2] - 7:18; 26:19 somewhere [1] - 28:14 sonar [1] - 47:5 soon [1] - 53:21 sorry [7] - 4:18; 9:4; 24:8; 35:21; 40:6; 44:14 sort [35] - 14:8; 15:20; 16:21; 17:13; 18:2, 6; 19:11, 13; 21:11; 22:25; 23:10; 26:21; 28:22; 29:10; 30:7-9, 11; 32:9, 20; 33:1, 17; 37:16; 39:25; 40:9, 15; 43:6, 24; 44:7; 45:4; 47:1; 48:9 sound [1] - 17:2 sounds [1] - 49:3 source [1] - 10:1 South [2] - 2:3, 8 special [3] - 28:1, 6; 43:21 specific [6] - 12:21; 17:24; 18:21; 22:12; 43:12; 46:19 specification [1] - 12:5 spectroscopy [2] - 21:1; 22:10 speed [3] - 46:7; 47:2 spend [3] - 25:11, 21; 29:21 spraying [1] - 39:16 sputtering [1] - 39:12 square [1] - 45:10 Square [1] - 2:22 stage [2] - 25:24; 35:6 standing [1] - 20:3 start [9] - 3:17; 10:8; 13:15, 21; 21:16; 24:20; 29:6; 30:23; 32:13 started [3] - 12:8; 34:16; 41:5 starting [1] - 18:19 starts [4] - 5:16; 29:8, 17; 47:3 States [1] - 2:21 STATES [2] - 1:1, 12 statistically [1] - 25:5 stay [1] - 31:25 stays [1] - 32:9 stem [1] - 27:25 STEM [7] - 20:15, 19; 46:5, 13, 15</p>
S		
<p>S-E-M [1] - 46:1 sample [10] - 16:13, 17, 20; 18:19; 20:7; 21:3; 47:1; 49:19, 21 Sample [7] - 18:10, 23-24; 35:7, 9 Samsung [1] - 25:5 San [1] - 1:16 saw [7] - 15:14; 16:11, 24; 32:24; 35:16; 52:12; 53:9 scale [1] - 45:4 scanning [3] - 19:6; 20:14; 46:3 scattered [1] - 15:20 scenes [1] - 25:11 scheduled [1] - 54:9 scheduling [1] - 53:24 school [2] - 26:14; 47:9 School [1] - 26:24 scientific [1] - 6:8 scientists [1] - 5:23 Scott [4] - 2:20; 55:2, 5 scottwallace.edva@gmail.com [1] - 2:23 screen [1] - 29:24 seal [4] - 52:15, 17; 53:1 sealed [2] - 45:2; 52:16 second [18] - 4:10; 5:2; 24:10; 26:17, 22; 27:21; 30:18, 21; 37:19, 22; 38:16, 25; 39:4, 6, 8, 24; 40:20; 48:18 secret [1] - 34:6 section [8] - 15:6, 8, 23-24; 20:12, 16, 21 sectional [1] - 20:6 see [59] - 5:4; 6:7, 10-11; 7:20, 22; 8:3, 25; 9:7; 10:9, 23-24; 11:18, 25; 14:5, 17, 19, 25; 15:5, 8-9, 13, 16, 18, 21, 25; 16:2, 7, 10, 17; 19:10; 20:16; 21:10; 22:25; 23:1; 26:14; 28:4, 10; 30:4, 13, 16; 36:9, 18; 38:7; 39:18, 20; 44:2, 25;</p>		

<p>step [5] - 31:5, 10; 41:1; 42:9; 54:7</p> <p>still [1] - 51:19</p> <p>stop [1] - 40:15</p> <p>storage [1] - 25:15</p> <p>store [3] - 6:20; 35:13; 38:15</p> <p>stored [3] - 7:25; 28:14; 29:4</p> <p>storing [1] - 29:11</p> <p>Street [5] - 1:15, 19; 2:3, 8, 17</p> <p>stress [2] - 11:4, 6</p> <p>structural [1] - 5:25</p> <p>structure [17] - 5:8, 24; 6:3, 8; 8:11, 14; 9:13, 17, 21, 23; 13:6; 26:8, 16; 29:19; 30:7; 45:24</p> <p>structures [1] - 45:21</p> <p>stuck [2] - 45:14, 21</p> <p>studying [1] - 51:20</p> <p>submerge [2] - 33:9; 41:17</p> <p>submerging [1] - 39:16</p> <p>Suite [4] - 1:20; 2:4, 8, 13</p> <p>Sun [1] - 34:13</p> <p>supply [1] - 12:18</p> <p>supposed [1] - 31:3</p> <p>surface [36] - 10:6, 25; 11:13, 21; 12:3, 7, 17, 23, 25; 15:9; 21:16, 19; 22:6, 17; 23:12, 16; 32:2; 33:19; 35:18, 20, 22-23; 36:3; 41:12; 42:1; 43:19, 24; 44:5; 47:5; 50:10, 23; 51:5, 10-11, 13</p> <p>surfaces [4] - 10:13; 33:11; 41:18; 44:8</p> <p>surprising [1] - 41:3</p> <p>surprisingly [1] - 24:12</p> <p>surrounded [1] - 10:3</p> <p>SW [1] - 2:12</p> <p>switch [1] - 44:11</p>	<p>temperatures [1] - 14:5</p> <p>term [1] - 13:10</p> <p>terminology [1] - 46:6</p> <p>terms [4] - 3:16; 25:23; 52:8; 54:4</p> <p>terribly [1] - 54:2</p> <p>test [3] - 23:23; 46:17</p> <p>tested [3] - 15:12; 16:16, 22</p> <p>testimony [1] - 52:13</p> <p>testing [6] - 6:6, 8; 18:1; 23:2, 4; 44:12</p> <p>tests [2] - 35:2; 46:14</p> <p>text [1] - 49:20</p> <p>therefore [1] - 11:15</p> <p>Thereupon [1] - 49:4</p> <p>they've [3] - 19:18; 36:24; 46:14</p> <p>thick [1] - 42:5</p> <p>thicker [1] - 42:8</p> <p>thin [1] - 19:18</p> <p>thinner [1] - 36:13</p> <p>thinnest [1] - 45:3</p> <p>third [5] - 4:25; 22:2; 28:1; 37:10; 38:19</p> <p>three [8] - 4:24; 8:23; 9:16, 23; 28:3; 32:17; 36:19; 37:3</p> <p>three-dimensional [2] - 8:23; 9:23</p> <p>throughout [3] - 15:20; 16:22; 38:17</p> <p>tiny [3] - 17:25; 19:2; 25:22</p> <p>titanate [1] - 5:7</p> <p>titanium [18] - 9:1; 11:20; 12:17, 20, 24; 14:3, 13-14; 18:20; 21:21; 22:6, 19, 21; 29:20; 48:17, 19, 21</p> <p>title [1] - 32:15</p> <p>titled [1] - 5:5</p> <p>today [5] - 5:23; 51:23; 52:12, 25; 53:18</p> <p>together [2] - 9:10; 23:18</p> <p>TOLLIVER [1] - 1:11</p> <p>took [2] - 16:14; 53:3</p> <p>top [9] - 15:9; 28:18, 21; 29:12; 36:2, 11; 40:4; 42:5; 45:6</p> <p>towards [2] - 12:23; 17:6</p> <p>tracking [1] - 13:13</p> <p>transcript [3] - 2:24; 53:20; 55:3</p> <p>TRANSCRIPT [1] - 1:11</p> <p>transcription [1] - 2:25</p> <p>transition [8] - 26:23; 27:5, 13; 39:8; 48:13, 18, 20, 22</p> <p>transmission [4] - 20:14; 44:24; 46:3</p> <p>trapping [1] - 37:7</p> <p>treatment [1] - 36:21</p> <p>trenches [2] - 20:2, 5</p> <p>tricky [1] - 23:23</p> <p>tried [1] - 35:2</p> <p>try [2] - 24:15; 53:5</p> <p>trying [8] - 5:11; 6:1; 29:2, 21; 46:7; 47:19; 48:7; 49:8</p> <p>turbine [1] - 29:14</p> <p>turn [2] - 20:11; 51:23</p> <p>tutorial [2] - 3:14; 24:10</p> <p>tweak [1] - 35:3</p>	<p>twice [1] - 48:1</p> <p>two [21] - 6:23; 14:18; 16:23; 21:7, 9; 26:13; 28:4; 33:18; 37:11; 40:19; 46:20; 47:8, 22; 48:1, 4, 12; 49:8, 14; 50:12</p> <p>two-dimensional [2] - 21:7, 9</p> <p>type [1] - 22:24</p> <p>types [3] - 18:7; 21:24; 32:17</p> <p>typically [1] - 7:4</p>
T		
<p>T-E-M [1] - 20:19</p> <p>table [6] - 27:2, 10, 14; 28:2; 35:11</p> <p>tablet [1] - 25:7</p> <p>tackled [1] - 5:23</p> <p>talks [4] - 13:9; 27:12; 32:15; 38:20</p> <p>taught [1] - 31:4</p> <p>TDM [1] - 44:17</p> <p>teach [1] - 24:13</p> <p>teaches [1] - 24:17</p> <p>team [1] - 47:19</p> <p>technical [1] - 3:14</p> <p>technique [11] - 19:6; 20:14, 25; 21:6; 22:11, 14; 26:15; 33:12, 15; 40:4, 22</p> <p>techniques [13] - 6:7, 10; 18:2, 7-8; 23:2, 4, 10; 33:23; 37:2; 39:14; 40:4, 19</p> <p>technology [4] - 4:2, 16, 24; 42:19</p> <p>TECHNOLOGY [1] - 1:3</p> <p>Technology [1] - 3:4</p> <p>TEM [6] - 17:19; 20:19; 44:21, 23; 45:19</p> <p>temperature [6] - 12:21; 13:20; 36:3; 42:21; 43:1; 49:24</p>		
U		
		<p>ultimately [1] - 31:23</p> <p>um-hmm [1] - 13:18</p> <p>uncoated [1] - 11:9</p> <p>under [7] - 11:4; 14:4; 18:21; 28:15; 47:14; 52:17; 53:1</p> <p>underlies [1] - 4:2</p> <p>uneven [1] - 36:14</p> <p>unevenly [2] - 35:15; 36:1</p> <p>unique [1] - 42:11</p> <p>United [1] - 2:21</p> <p>UNITED [2] - 1:1, 12</p> <p>units [1] - 48:9</p> <p>universe [1] - 22:25</p> <p>Unless [1] - 44:11</p> <p>untreated [1] - 36:13</p> <p>up [26] - 8:1, 18; 15:14; 21:19; 24:2; 25:8; 28:18, 20; 29:11; 32:6; 33:4; 36:19, 24; 37:18; 38:23; 41:17; 42:10; 43:6, 23; 44:8; 45:2, 15; 46:7; 49:6; 52:12</p> <p>updated [1] - 4:8</p> <p>upper [1] - 36:9</p> <p>urging [1] - 53:4</p> <p>uses [3] - 13:10; 19:23; 20:15</p>
V		
		<p>VA [2] - 1:20; 2:22</p> <p>Vaala [4] - 4:19; 24:5; 53:7, 17</p> <p>VAAALA [2] - 4:20; 24:7</p> <p>Vaala's [1] - 54:8</p> <p>vacuum [1] - 45:2</p> <p>vapor [1] - 39:13</p> <p>varies [1] - 48:6</p> <p>variety [1] - 39:9</p> <p>various [2] - 21:3, 11</p> <p>version [3] - 4:7; 11:18, 24</p> <p>versus [6] - 3:4; 21:5, 19; 27:17; 47:21</p> <p>via [1] - 4:8</p> <p>VIRGINIA [1] - 1:1</p>
W		
		<p>walk [1] - 18:1</p> <p>wall [10] - 15:15, 20, 24; 16:3, 5, 8; 18:16; 19:1; 20:22; 51:6</p>

Wallace [4] - 2:20; 55:2, 5
walls [14] - 11:1, 8, 12, 14, 22, 25;
 12:7; 15:13; 17:14; 20:16; 23:14; 50:18;
 51:7, 14
wants [2] - 25:17
wardrobe [1] - 45:1
wardrobe-like [1] - 45:1
Washington [1] - 2:13
water [3] - 28:18, 20, 22
ways [3] - 32:12; 37:16; 47:8
weaken [1] - 9:21
weakening [1] - 9:23
weeks [1] - 44:18
weighs [1] - 47:11
weight [2] - 47:25; 48:3
weights [3] - 47:10; 48:8
well-founded [1] - 26:14
wherein [2] - 17:15; 44:15
white [2] - 15:10; 45:20
whole [6] - 17:2; 31:4; 38:7, 11; 42:5;
 48:5
willing [1] - 53:6
won [1] - 4:16
wonderful [4] - 3:21; 4:5; 53:8; 54:3
word [1] - 26:20
works [2] - 30:21; 41:19
written [1] - 52:7

X

x-ray [3] - 21:1; 22:10; 45:12
XPS [4] - 22:7, 10; 46:17, 24

Y

year [1] - 25:15
years [2] - 26:11; 28:8
yellow [3] - 21:10, 12; 39:21
Yimeng [2] - 2:7; 3:8
yimeng.dou@kirkland.com [1] - 2:10

Z

zoom [1] - 30:3
zoomed [3] - 30:1, 3; 37:25
zoomed-in [1] - 30:1